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Chime Whistles on the Chicago, Milwaukee & St. Paul

RULE 32 of the Standard code is very short, consisting of only 12 words: "The unnecessary use of either the whistle or the bell is prohibited." Whether or not the absence of amplifying or explanatory phrases is an indication of the difficulties which officers have in enforcing the rule we do not know; but the brevity is suggestive. The rule has been the subject of frequent editorial exhortations in these columns, but usually with encouraging response from only a very small fraction of the number of railroad officers who ought to be interested in a question so intimately related to the problem of pleasing the public. Today, however, the query arises whether our occupation (as exhorter) is not in danger of total abolishment, as unnecessary; the Chicago, Milwaukee & St. Paul is using a chime whistle which is so "extremely soft and pleasing to the ear" that people are liable soon to be demanding that whistles be used more rather than less! The railroad's announcement is noticed in another column. The natural comment on this news, at first blush, is that it is too good to be true; but everybody with sensitive ears certainly will hope to see it prove true, and that the practice will spread. In some religious circles the genuineness and intensity of a sinner's repentance is often judged by the vehemence of the language with which he renounces and denounces his former practices; recalling this principle of psychology, it is gratifying to see that the chief executive of the St. Paul now recognizes that the whistle nuisance has "set millions of teeth on edge and caused shivers in countless spinal columns." This significant indication that the neglect to abate the nuisance, so general in the past, has not been due to ignorance of its existence, should give hope that the good example of the St. Paul will rapidly find imitators.

The New Locomotive—an Economic Unit

A COMPARISON of new locomotives—such as the Union Pacific 4-12-2 type recently placed in service—with the prevailing type of ten years ago, causes one to wonder what the locomotive of ten years from now will be like. Some executive and mechanical department officers have expressed the thought that increased efficiency and capacity are being purchased at the expense of locomotive simplicity and increased maintenance cost. This is true, but can the results be obtained in any other way? The history of the development of motive power of all kinds indicates that they cannot. The so-called complications are essential for obtaining increased efficiency and capacity, and they must be considered in the broad business sense as increasing the economic value of a locomotive. The calculation of maintenance costs, based on the locomotive-mile unit, is not a reliable method of determination. The size and capacity of a locomotive are important factors in the cost of running and shop repairs, as well as the rate and amount of work performed. The mileage basis of calculating maintenance costs eliminates these factors. If considered on a mileage basis, the maintenance of the modern locomotive will exceed that of locomotives of older construction. But, if the so-called complications are factors that result in substantially increased capacity, the modern locomotive will do more work and the additional maintenance will be offset by increased earning capacity. The best basis for the consideration of maintenance costs is one that will involve capacity as well as the rate and amount of work performed by a locomotive. A public utility corporation considers each of its power plants as an economic unit. Why should not the locomotive be considered in the same way? If the original cost of the locomotive is known, the carrying charges can be determined and the annual cost of operation can be compared with the work performed. Each locomotive should be considered as an economic unit for the production of ton-miles and its costs should be considered in relation to the ton-miles produced.

College Men in Industry

IN his book on "The New Leadership in Industry" and in discussing the education of the executive, Sam A. Lewisohn points out these facts: "First, the increasing importance of engineers as industrial executives; second, the fact that the management of labor relations is largely in their hands; third, the overwhelming importance of a proper administration of these relations; and, fourth, the lack of preparedness of engineering executives to handle these matters properly." With these thoughts in mind it is interesting to note the following comment in the Yale University survey by Messrs. Topping and Dempsey, of current methods of study and instruction and of research and experimentation in the field of transportation: "All the talk about the shortcomings of the college man, his lack of human understanding and judgment, his inability to stick, is but a mask which hides the real trouble. The average college man is the ordinary mortal plus a little mental and psychological training, and if the best graduates see no attractions in the railway business, then the most capable young men who have no college training will probably also shun the industry. If there is to be improvement two things are necessary: first, careful consideration must be given to the election of young men as recruits for the business, whether such men be college graduates or not; second, opportunity must be provided, in the crucial early years of the man's railway experience, for ability to be made

apparent and rewarded, so that seniority may be relegated to a position of secondary rather than primary importance." No one topic in the railway field can start a quicker or more heated discussion than the question of the use of college men. It is admitted, of course, that a certain number of college trained men are necessary in the engineering and more technical or professional departments. The real controversy seems to hang on the question of the ability of the college man as an executive. College training does not make the man, as is clearly indicated in the comments from the Yale report, although it may be helpful in increasing his effectiveness, if he has the right stuff in him. Is it not true, however, that there would be less question about the value of engineering graduates for executive positions if they received the sort of training suggested by Mr. Lewisohn, and then followed up their work on the railroad in the full realization that their education in handling labor relations must be a continuing process?

Is Traffic the Sole Criterion of Public Convenience?

THE argument has been advanced by those in favor of unrestricted interstate motor vehicle operation that the public by its patronage has already given its approval of this form of transportation. Ergo, these vehicles are fulfilling a public want and their "convenience and necessity" to the public is thereby clearly demonstrated; no certificate to this effect should therefore be required from any public service commission. This argument is harmful to the railroads and it is so ridiculous that friends of the railroads should stand ready to scotch it whenever it appears—which is all too frequently. A specific and well-known case makes the fallacy in such an argument clear. The economic life of the South Jersey seashore is dependent in large measure upon persons from Philadelphia and surrounding territory who make their summer homes in, or frequent visits to, these resorts. Buses plying between Philadelphia and the Jersey shore, as pointed out by President Dice of the Reading, do not cater to passengers who form the "economic backbone" of this section at all. That is to say, they do not provide for commuters and cheap one-day excursionists. Instead they cater to the occasional passenger who does not object to a slow trip and the passenger who, if he went by rail, would be charged full fare. The low-paying traffic the railroad is welcome to. Is public convenience served by this kind of bus service, railroad service being what it is? Decidedly not. If full-fare passengers continue to desert the trains for the bus, the railroads cannot without confiscation of their property continue to carry the bulk of the traffic at low rates. If rates were considerably increased on this traffic it would decline greatly—bringing a loss to the seashore cities and keeping many persons in the city who could otherwise enjoy themselves at the seashore. There would also be the needless duplication in facilities, i.e., both rail and buses where railroads alone would carry the traffic. Moreover, reduced demand for railroad service would not make likely a continuance of the same excellent service now provided, making residence at the seashore impossible for still more persons. Would public convenience and necessity be served by such an eventuality? Manifestly not. The public is all the people and not just a small group. It comprehends more than the persons who under such circumstances operate or ride in buses.

Railroad Clubs on the Job

RAILROAD club officers and committees are busy planning programs for the fall season. The progress made during the past year was little less than remarkable. There was no tendency to mark time in any of the clubs; on the other hand, there was a marked inclination to reach out into new fields and to broaden and expand the club activities. One of the most outstanding developments, which will undoubtedly be aggressively followed up during the coming season, was the preparation of programs of particular interest to the younger men and the attempt not only to interest them in the club activities, but to get them to take a real part in the programs. This has inspired many of the older members to take a greater interest in the boys and young men in their organizations. Seldom has any innovation been so cordially received.

Several of the clubs have continued to schedule programs on subjects relating to human relations, supervision, leadership, etc., thus sustaining their reputation in having taken the initiative among all of the railroad associations in appreciating the vital importance of these matters in successful railroad operation.

The Pacific Club, with favorable climatic conditions, continues to hold twelve meetings a year, alternating between San Francisco and Oakland. Last season it extended its activities to Sacramento, holding two meetings at that place; these, however, were in addition to the twelve regular monthly meetings. These special meetings were well attended and so much interest was stimulated among the Sacramento group that the June meeting of the club at Oakland was given over to the consideration of operations in the Sacramento shops, the addresses being made by Sacramento members.

While railroad officers at Cleveland have always cordially supported and backed up the Western and Central Clubs, it was impossible for considerable numbers of the group at Cleveland to attend the meetings of either of these two clubs. The Cleveland Steam Railway Club was therefore organized. It has been growing rapidly and will apparently devote most of its activities to the interests of the men related to the car department, although there has been some tendency to broaden its programs beyond that field. Incidentally, the Central Club, which had held its meetings bi-monthly, found it advisable about a year ago to schedule informal meetings for the alternate months. These proved to be so popular and such excellent material was developed that it was decided to include reports of these meetings in the bi-monthly proceedings. This has very considerably enlarged the club proceedings and the meetings of the club are now practically on a monthly basis.

The New York Club, which was noted in the old days for its "Annual Electrical Nights," has tried the experiment during the past two years of reviving this feature and scheduling two such nights for each year. These have proved to be the most popular and largely attended of the regular meetings.

Another noteworthy development has been the marked improvement in the appearance of some of the club proceedings. This is indicated in some of those which have largely preserved their old stereotyped appearance, by the use of display type not only for the headings of the principal addresses, but for the more important contributions to the discussion. This is particularly noticeable in the proceedings of the Central Railway Club. The Western Railway Club has changed its dress quite radically and considerable improvement has been made in the typographical arrangement. The photographs of the club officers and of the speakers at the

annual dinner added to the attractiveness of the May proceedings. The honor of making the greatest advance in improved appearance of the proceedings, however, undoubtedly belongs to the Pacific Railway Club.

While much stress has been placed upon the improvement of the technical programs, the importance of promoting a get-together spirit has not been lost sight of. Hardly two of the clubs have approached the problem in the same way, but special stress is now being placed upon it by all of them. The intimate contacts thus formed are probably as valuable, if not more so, in bringing about understandings and getting the members in touch with sources of information as are the more formal proceedings. Closely allied to this is the experiment which is being tried by some of the clubs, of regularly scheduling entertainment features on their programs which are provided by railroad talent. The amount of such high grade musical and other talent which is available is surprising. The problem is made all the easier for the club officers by the fact that more or less rivalry is developing between the different railroad groups to see which one can put on the most attractive program.

Just what the effect on the railroad clubs will be of the considerable number of supervisors' and foremen's clubs which are being formed on the railroads is a question. It looks very much as if these would supplement the work of the railroad clubs; the latter will undoubtedly continue to be super-organizations, because of bringing together the groups from the different railroads and the fact that they can schedule certain features on their programs which the smaller, local organizations would find it difficult or impossible to reproduce. Then, too, the railroad clubs include in their membership men of all classes who are interested in railroading, whether they be railroad officers or employees, representatives of railway supply houses, college professors and students, bankers, economists, or what-not. It does, however, behoove the railroad clubs to study the progress of the local supervisors' clubs, in order that they may so build their programs as to exert a helpful influence and maintain their position of leadership. Obviously, also, the training which the members will receive in their local organizations will better fit them to take a more effective part in the work of the larger clubs.

The Passing of a Generation

IT is only on the occasion of some special event that one realizes how short an interval has intervened since the time when a large portion of the United States was a wilderness. Such a reminder is afforded by the death of William Hood on August 26, for it marked the passing of one of the last, if not the last, of that sturdy group of pioneers who laid the foundation for our present network of railway lines through what were then new and uncharted areas. Few of the present generation realize the courage and daring displayed in the location and construction of these early roads in advance of settlement and with none of the facilities of present day construction. They evinced engineering skill of a high order.

Hood typified this early school. He left college to participate in the building of the Central Pacific across the Sierra Nevada mountains in 1867, the first rail connection between the Mississippi valley and the Pacific coast. He became chief engineer of the Southern Pacific, Pacific System, in 1885, and for more than a third of a century had charge of the development of that system's vast mileage of lines in the far west. Outstanding among his achievements which will stand as memorials to his generation are the Tehachapi loop in central California; the crossing of the Siskiyou mountains in southern Oregon with its S-line which passes over the Sacramento river 18 times and through 16 tunnels, one 3,000-ft. long; the building of the Lucin cutoff and the causeway across Great Salt Lake in Utah, and the construction of the San Diego and Arizona line through Carriso gorge in southern California.

It has been through the efforts and the ability of men such as these that the "west" has been opened up to civilization and settlement in little more than a half century. The railways have made this development possible. The pioneers of a generation ago, led by men of the type of Grenville M. Dodge and William Hood, made the railways possible. Their achievements constitute a romantic page in American railway history that will long serve as an inspiration for the generations to come.

Railroad Dividends

THERE has occurred during the last three years, and especially within the last year, a large advance in the average prices of railway stocks on the New York Stock Exchange. The *Railway Age* publishes each week toward the end of its "Railway Financial News" columns the average current prices of twenty representative railway stocks. In the second week of September, 1923, their average price was $61.29; at the corresponding time in 1924, $70.08; 1925, $86.73; 1926, $105.74.

The general advance in the prices of railway stocks has been largely due to general financial conditions, but it also reflects a growing confidence of investors in them. The net operating income of the railways has been increasing. Investors know that this gives assurance that dividends now being paid probably will be maintained. It also inspires a hope that the dividends of many railways will be increased. Undoubtedly this hope of increased dividends has been an important influence in causing the increase in prices.

The history of railway dividends during the last twenty years probably illustrates the financial ups and downs the carriers have had better than any other part of their history. They were enjoying unprecedented prosperity when effective federal regulation was adopted with the passage of the Hepburn Act just about twenty years ago. Net income per share of stock was increasing, dividends were being advanced and the prices of stocks were going up. At just about that time the country entered a period of advancing wages and prices. The railways in 1910 sought to offset these increases in wages and prices by making advances in their rates. The Interstate Commerce Commission in 1911 refused to grant the proposed advances in rates.

It is a significant fact that in that year railway dividends reached high water mark, and averaged about 5.4 per cent on all the stock outstanding. The total cash dividends distributed by the Class I roads amounted to $397,000,000. The average net income per share of railway stock then began to decline and with it the dividends. Five years later, in 1916, the dividends of the Class I roads amounted to only $306,000,000, and the average rate paid on all railway stock was about 4.2 per cent. In 1911 dividends were paid on 67.65 per cent of all the railway stock outstanding, and in 1916 on only 62 per cent of it. Following government control and the business depression in 1921, dividends reached their

lowest level for many years in 1922. In that year they were paid on less than 60 per cent of all the stock outstanding, the cash dividends of the Class I roads being less than $271,600,000, and the average cash rate on all outstanding stock 3.8 per cent.

Thus, within ten years dividends had declined more than $125,000,000 and the average rate on all stock had declined from 5.4 to 3.8 per cent, or about one-third. Many railways quit paying dividends, while others reduced them.

An upward trend began in 1923. The total paid by the Class I roads in that year was $296,000,000 and the average on all outstanding stock was 4 per cent. In 1924 cash dividends increased further to almost $325,500,000, and in 1925 to almost $341,000,000, but the average paid on all outstanding railway stock in the latter year was only 4.4 per cent, and the total paid by Class I roads was still $56,000,000 less than in 1911. Dividends were paid last year on about 65 per cent of all railway stock outstanding, leaving, of course, about 35 per cent on which none was paid.

During the period reviewed the traffic and earnings of the railways, their operating expenses, their wages, their property investment, their fixed charges and their taxes all enormously increased. The purchasing power of money declined from one-third to one-half. In spite of all this, the returns received by the class of security owners who take the risks and give real vitality to every business enterprise and industry had declined. The explanation is only too simple. Operating expenses and fixed charges on indebtedness had increased so much more in proportion than net earnings that the amount of income left with which to pay the stockholders greatly declined. If allowance be made for the reduction in the purchasing power of money, the stockholders of American railways did not receive much more than one-half as much in dividends last year as they did fourteen years before.

Investors will not buy stock unless they feel reasonable assurance of getting a return of seven per cent or more upon their investment. Investment in stock involves risks that investment in bonds does not, and unless investors feel reasonably sure of dividends in excess of current interest rates on bonds they will not buy stocks. The effect of the reduction in the dividends paid on railway stocks is written large in the financing done by them in recent years. In the six years ending with 1925 the railways, in raising capital to improve and expand their properties, issued $2,822,268,000 in new securities. Of these almost $2,697,000,000, or 90 per cent, consisted of bonds and notes that increased their indebtedness and fixed charges. To say that too large a part of their capital has been raised by going into debt becomes a very conservative statement in the face of such astounding figures. A continuance of such financing would inevitably lead to widespread disaster.

Heretofore the financing of railway improvements mainly by increasing indebtedness has been largely unavoidable. The increase in the average price of stocks that recently has occurred indicates that conditions in this respect are much improved. Nobody knows, however, how much they really are improved. Stock market prices are not a real test. The real test will come when railways that are paying substantial dividends, and whose stocks are selling at high prices, try to sell large amounts of new stock.

It appears that as a matter of sound policy railroads that are able to pay substantial dividends should pay them, and those that are paying them should make a real test of their ability to finance by the sale of stock. Cessation of the disproportionate increase in railroad indebtedness and a wider distribution of the ownership of stocks is needed in the interest of both the railways and the public. Railway executives long have been saying that the railways need more partners and fewer creditors. Public utilities have been far in advance of the railways in increasing the number of their partners, and they are deriving substantial benefits from so doing. It would seem that the railways should not only insist upon their right to earn enough to pay substantial dividends, but, when allowed to do so, should offer the public a larger opportunity to participate in the risks and profits of the railroad business.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Government Owned Corporations, by Harold A. Van Dorn. A study by an instructor in government, Columbia University. 320 p. Pub. by Alfred A. Knopf, New York City, $3.

How the World Rides, by Florence C. Fox. Bureau of Education Bulletin, 1926, No. 8, presenting a series of projects on transportation for elementary schools. Chapter II, "The Railroad Train," p. 18-27. Other chapters discuss animal transport and the evolution of the wheeled vehicle, automobiles, airplanes and airships, and inland waterways. Illustrations and suggested readings. 81 p. Pub. by Govt. Print. Off., Washington, D. C., 25 cents.

One Hundred and Forty Years, 1786-1926. History of superheaters, more especially of their application to locomotives. 12 p. Pub. by Superheater Company, New York.

The Port of New York, prepared by Board of Engineers for Rivers and Harbors, U. S. War Dept., and U. S. Shipping Board. Port Series No. 20 in 3 parts, I—General report; II—Piers, wharves and docks (statistical data); III—Atlas of port facilities (maps with index). 3 vols. Pub. by Govt. Print. Off., Washington, D. C., $2.25.

Principles of Publicity, by Glenn C. Quiett and Ralph D. Casey. What publicity is, and is not, and how it can be made more effective. 420 p. Pub. by D. Appleton, New York City. $3.

Periodical Articles

Foreign Loading Gages. Gages and clearances for 7 European, Japanese, 1 Australian, and the Argentine state railways together with the international maximum loading gage. Bulletin of the International Railway Congress, August, 1926, p. 779-781.

An Introduction to the Study of Electric Traction in Natal, by T. P. Pask. Describes the electrified section of the South African railways between Glencoe and Maritzburg. Transactions, South African Institute of Electrical Engineers, May, 1926, p. 87-113.

Investigation into the Principal Causes of Railway Accidents, by J. Maincent. While this careful study into almost every cause of train accidents applies to French railways, the examples and conclusions are apt to be interesting to anyone concerned with train operation. Bulletin of the International Railway Congress, August, 1926, p. 719-735.

Northern Pacific Achievements. Recent operating and financial accomplishments. U. S. Investor, September 11, 1926, p. 23-25.

Rail-Cum-Road Travel Facilities. Editorial suggestion that studies be made at terminals in Great Britain of possibilities of motor-coach services similar to those of the Baltimore & Ohio at New York City. Modern Transport [London], September 4, 1926, p. 2.

Rate Base for Effective and Non-Speculative Railroad and Public Utility Rate Regulation, by John Bauer. Analysis of Prof. H. G. Brown's "Railroad Valuation and Rates Regulation," included in Booklist of October 31, 1925. Reply by Prof. Brown on pages 500-508 of this [Aug. 1926] issue, with additional comment by Mr. Bauer following on pages 508-513. Journal of Political Economy, August, 1926, p. 479-500.

Thirty-Fourth Meeting of T. E A.

The modern traveling power plant and its utilization, the principal themes discussed

THE growing importance of horsepower as opposed to tractive force as a basis of rating modern locomotive capacity, the importance of improvements in design to increase the reliability and decrease the cost of maintaining locomotives, and the improvements which are rapidly taking place in locomotive operating methods were the outstanding points brought out in a symposium on The Locomotive of Today, which was one of the outstanding features of the thirty-fourth annual convention of the Traveling Engineers' Association, held at the Hotel Sherman, Chicago, September 14 to 17, inclusive.

The convention brought together a large number of road foremen of engines, mechanical officers and operating officers, and was accompanied by an unusually large exhibit of locomotive and shop appliances. The meeting was called to order by the president, J. N. Clark, Southern Pacific, who, after the usual invocation and welcome by a representative of the city, addressed the members in part as follows:

President Clark's Address

During the past year it became my pleasant duty to select two committees from our membership to co-operate with the American Railway Association's committees on Locomotive Utilization, and Locomotive Construction and Design. Invitations have been extended to the chairman and members of those committees to attend our convention. The very friendly attitude of Mr. Aishton and other officers of the American Railway Association is, I am sure, very much appreciated by this association.

The responsibility of the traveling engineer increases with the ever increasing demand for better transportation. Coming within our immediate supervision is a vast army of 133,000 locomotive enginemen and firemen who look to us for education, guidance and inspiration. Our managements look to us for expert advice on everything that pertains to the modern locomotive, proper distribution of power to serve the industry best, advice upon all new locomotive appliances, fuel economy and smooth train handling to insure a safe and on-time performance.

There is only one way through which we can render satisfactory service, and that is through education, and what a wonderful medium we have, to acquire education through our association. There is not a member who has not had many of his most troublesome problems solved by having them discussed at our annual gatherings. Grouped in the next room is the finest and most complete collection of modern locomotive appliances ever assembled, and each device is presided over by an authority who is not only willing but anxious to impart to you the knowledge he has gained through intensive study.

Seven new records were established by the railroads of the United States in 1925. Included in this remarkable performance are several records over which the traveling engineer has direct supervision. Are we not, therefore, justified in feeling proud of these accomplishments? Our records mean nothing to Mr. Aishton; he makes them today, only to break them tomorrow.

But don't you get a "kick" out of breaking records? Let us pick up enough new ideas during the next four days to go home and smash all the records he can put up for us to shoot at during the next 365 days.

Progress means going forward and civilization has shown the greatest progress where transportation has been developed to its highest efficiency. China, with a population of 400 million, has less than 7,000 miles of railroads to serve its four and a half million square miles of territory, while the United States, with a population of 116 millions, has over 250 thousand miles of railroads to serve its three million square miles of territory. Transportation has been the big civilizing influence in ours, and every other country, and we should feel a just pride in our contribution to such an industry.

Address by Commissioner McManamy

In addressing the association, Commissioner Frank McManamy said that the Interstate Commerce Commission is interested in results for which the traveling engineer probably to as great an extent as any other single class of railroad employees is responsible. He referred to the previous mention of the expensive operation of the New York barge canal, stating that erroneous conclusions are almost sure to be drawn from statistics unless all conditions are known and taken into consideration in interpreting them. The canal for example has been trying to get railroads to interchange freight with it unsuccessfully and, Mr. McManamy said that the case would probably eventually go to the United States Supreme Court for final decision. He asked what railroad could be operated successfully if the roads at its most important terminals refuse to interchange freight with it.

All railroads furnish statistics to the Interstate Commerce Commission and the figures indicate remarkable results in improved operation during the past few years. Mr. McManamy quoted figures to show the improvements made, some of which are as follows: since 1916 the number of locomotives has increased 4.3 per cent, the total tractive force 27.8 per cent, the average tractive power per locomotive 22.5 per cent, the total ton miles 15.1 per cent, ton miles per mile of road 11.5 per cent, passenger miles per mile of road 1.3 per cent, revenue tons per train 23.5 per cent and revenue tons per loaded car 15.3 per cent. The traveling engineers who play an important part in securing this improved railroad operation should continue their efforts.

Mr. McManamy explained that there are twenty-eight separate acts of Congress to be enforced by the Interstate Commerce Commission, nine of which relate

directly to safety. With the small force which the law provides it would be impossible to secure anything approaching enforcement of these laws without the co-operation of railroad officers. Experience over the past nineteen years indicates that at no time has the commission secured the co-operation of railroad men more fully than at present and consequently at no previous time has railroad equipment been so well maintained. Mr McManamy then quoted statistics showing the improvements in railroad operation as regards safety, but said that further improvement can be made with the Interstate Commerce Commission working with the railroads one hundred per cent.

This does not mean the shutting of inspectors' eyes to defects, which is not co-operation in the real sense of the word.

Address by A. G. Pack

In the opening session, the association was addressed by A. G. Pack, chief inspector of the Bureau of Locomotive Inspection, Interstate Commerce Commission, who devoted most of his remarks to the subject of fusion welding. In answering the question, "Is fusion welding permissible in locomotive firebox and boiler construction and repairs?" Mr. Pack said, "I am of the opinion that fusion welding, in the present state of the art, should not be used on parts of the locomotive, boiler, or tender where through failure of such parts there is a probability of accident and injury to persons. Its use in staid surfaces where failure would not result in personal injury and where the magnitude of the working stresses is small, and in locations where the welding is not subjected to overheating, seems to be relatively safe." Mr. Pack called attention to the Boiler Code of the American Society of Mechanical Engineers, which permits the use of fusion welding "in cases where the stress or load is carried by other construction which conforms to the requirements of the code and where the safety of the structure is not dependent on the strength of the weld."

Some space was then devoted in the paper to a discussion of locations, in which the records of many failures indicate fusion welding should not be employed, namely: boiler barrel, auxiliary steam dome, wrapper sheet seam extending into cab, driving wheel tires, engine truck wheels, main rods and side rods. It was pointed out that these instances could be multiplied indefinitely but should serve to show the caution necessary in the selection of parts to be welded by the fusion process. Mr. Pack also expressed concern over the application of fusion welding to locomotive fireboxes in areas which may be subject to overheating owing to the number of accidents chargeable to some extent to that practice. Mr. Pack closed his remarks, as follows:

"I do not desire to be understood as opposing fusion welding when properly and discreetly used, and believe that it has a very wide and useful field. If we are to profit by the experiences of others, we must give careful consideration to the result of all practices and methods. The extreme to which fusion welding has been carried is what I have taken exception to. It is not 'a cure-all,' nor can it be used indiscriminately with safety, nor even economy."

The Locomotive of Today—a Symposium Conducted by Samuel O. Dunn

On the second day of the convention a symposium was conducted on the general subject The Locomotive of Today. Samuel O. Dunn, editor of the *Railway Age*, made the opening address and presided. Other speakers were J. B. Ennis, vice-president, American Locomotive Company; W. E. Woodward, vice-president, Lima Locomotive Works, Inc.; C. T. Ripley, chief mechanical engineer, Atchison, Topeka & Santa Fe; and John E. Muhlfeld, consulting engineer, New York; A. G. Trumbull, chief mechanical engineer, Erie; W. L. Bean, mechanical manager, New York, New Haven & Hartford; O. S. Jackson, superintendent of motive power and machinery, Union Pacific; and A. R. Ayers, assistant general manager, New York, Chicago & St. Louis (paper read by W. G. Black, superintendent of motive power of the New York, Chicago & St. Louis). An abstract of Mr. Dunn's remarks follows:

What is "The Locomotive of Today?" One way in which we may answer that question is by describing recently installed locomotives of the most advanced types. Another way is by giving salient facts about the average locomotive of today and its performance as compared with that of the average locomotives of past periods.

Going back in the records twenty years, I found that in 1905 the heaviest locomotive ordered was a 2-6-6-2 type freight engine for the Great Northern having a weight of 355,000 lb. and a tractive power of 71,600 lb. The heaviest passenger locomotive ordered in that year was a 4-6-2 type for the Baltimore & Ohio, weighing 229,500 lb. and having a tractive force of 35,020 lb. One of the half dozen heaviest locomotives ordered in that year had an outside valve gear, but otherwise they were "plain engines"—in other words, with this exception, did not have upon them certain modern devices now extensively used.

One of the largest freight locomotives ordered ten years later, in 1915, was one of the 2-8-8-0 type for the Baltimore & Ohio which weighed 485,000 lb. and had a tractive force of 103,000 lb. It was equipped with a superheater, stoker and reverse gear. Of the seven heaviest locomotives ordered in that year, five had superheaters, four had mechanical stokers, four had power reverse gears and two had brick arches.

The heaviest freight locomotive ordered in 1925 was a 2-8-8-2 type single expansion engine for the Great Northern, weighing 594,940 lb. and having a tractive power of 127,500 lb. The second heaviest was a 2-8-8-2 type for the Chesapeake & Ohio, weighing 565,000 lb. and having a tractive force of 103,500 lb. This engine had all the special devices previously mentioned which have now come into widespread use, and in addition a feed water heater. The Union Pacific three cylinder 4-12-2 type freight locomotives have a weight of 495,000 lb. and a tractive power of 96,650 lb. Two of the seven heaviest types of locomotives ordered in 1925 were equipped with boosters. One of these was a 2-10-4 type freight locomotive for the Texas & Pacific, weighing

448,000 lb. and having, with the booster, a tractive power of 96,000 lb. The other was a three cylinder 4-10-2 passenger and freight locomotive for the Southern Pacific having a tractive power, with the booster, of 95,700 lb.

Important types of special devices not previously mentioned that have been developed to increase the power, and the operating efficiency and economy, of the steam locomotive include syphons and exhaust steam injectors. The use of steel castings and alloy steel to get increased power without correspondingly increased weight has become an important factor.

Larger fireboxes, better designed grates and higher steam pressures have helped to make the locomotive a more efficient power plant. The facts given illustrate the great development and improvement of the steam locomotive that have occurred during the last twenty years.

The effect of the improvement in locomotive design and construction in any given period can be most strikingly illustrated by showing the improvement in maximum performance. As an example of this, it was brought out in the discussion of one of the reports at the Mechanical Division convention at Atlantic City last June that a new 2-10-4 type freight locomotive built for the Texas & Pacific in 1925, when compared with an earlier design of 2-10-2 type having only slightly less weight on driving wheels, developed 44 per cent more drawbar pull at starting, 50 per cent more at 20 miles per hour and 50 per cent more at 40 miles per hour. An increased train speed of 33 per cent is credited to this locomotive and also a decreased fuel consumption (per thousand gross ton-miles) of 42 per cent. Other remarkable records made by the most modern power might be cited.

About 68 Per Cent of Active Engines Are Over 10 Years Old

On June 30, 1916, the Class I railways had approximately 48,055 locomotives. Between that date and June 30, 1916, they retired 15,570, or about 32 per cent of the total number, and installed 29,393 new locomotives. On June 30, 1916, they had 61,057 locomotives, and between that date and December 31, 1925, they retired 17,853, or 28 per cent of the total number, and installed 20,452 locomotives, which increased the total number to 63,656. The total retirements during this period of almost twenty years were 33,423, or 69 per cent of the number owned on June 30, 1906, while the number installed in service was 49,845, or 77 per cent of the total number owned on December 31, 1925. It would appear from the foregoing figures that about 32 per cent of the locomotives now in service are less than ten years old, and that about 78 per cent are less than twenty years old.

In this constant process of retirements and installations, the average tractive power of locomotives has steadily increased. In 1906 it was 24,741 pounds for all the locomotives owned by the railways, and in 1916 it was 32,423 pounds, an increase of 31 per cent. For the year 1925 we have only the statistics of Class I roads. The average tractive power of their locomotives in 1916 was 33,181 pounds and in 1925, 40,719 pounds, an increase of 23 per cent. The increase in the average tractive power per locomotive during the entire period of twenty years was about 65 per cent. In other words, at the beginning of this period of twenty years, five average locomotives had theoretically only as much pulling power as three average locomotives had at the end of it.

The desirability of acquiring heavier, more powerful and more complicated locomotives, as the railways have been doing, may be considered from two standpoints. One of these is that of direct cost, the other that of the output of transportation secured with them.

In costs that depend directly on the kind of locomotives used must be embraced a variety of items, including fixed charges on the investment, costs of depreciation and maintenance and fuel consumption. All these are pretty sure to be larger per mile operated for a large and complicated engine than for a smaller or more simple one. The installation of heavier power also very commonly makes necessary increased expenditures for the strengthening of bridges, the maintenance of tracks and other purposes.

When we look at the matter from the standpoint of the service that can be obtained, we get a different picture. The more powerful a locomotive is the larger the trainload it can pull. The larger trainloads are, the fewer trains have to be run to handle a given traffic. The smaller is the number of trains that is required to handle a given traffic, the more traffic can be handled before it becomes necessary to build additional main tracks.

If a locomotive is so designed, constructed and equipped that it can not only pull a larger trainload than the locomotive it replaces, but can also make higher average speed in pulling its increased load, its value as a means of increasing the efficiency and capacity of the entire railroad is greatly enhanced. By producing more ton miles of transportation per hour it reduces the total number of locomotives required; it postpones the time when increased investment in tracks and most other fixed properties to increase capacity will be necessary; it reduces the number of employees required; or that would be required in train service; it reduces the number of employees required in signaling and dispatching trains—in fact, there is hardly any form of fixed charges or transportation expenses that is not made less than it otherwise would be by locomotives that produce an increased output of ton miles per locomotive hour.

Actual Performance Is What Counts

We are more concerned, of course, with what a locomotive actually does than with what it theoretically can do. If its performance is not what it theoretically should be we want to know whether the trouble is with the locomotive itself, or with limitations imposed upon its utilization by shortcomings of other parts of the railroad plant or by faulty operating methods. The development and installation of locomotives of constantly improving types is important, but may waste more money than is saved if passing tracks are not lengthened, tracks are not strengthened, yards are not enlarged, locomotive runs are not extended and shop facilities are not improved enough to make it practicable to utilize the improved locomotives to their highest capacity. Everything done in the construction, operation and maintenance of a railroad, from the first grading to the pulling of the locomotive throttle, is done to enable locomotives to haul freight and passengers with maximum efficiency and economy. If the development of the locomotive gets ahead of the development of the means for maintaining and utilizing it, part of the benefits that might be obtained from it are not secured. Not long since there was a period of years when this was the situation on many railroads. The extensive drive which recently has been made to improve the utilization of modern power has borne remarkable fruit for the roads that have participated in it, but there yet remains much that can be done along this line.

When we review the railroad history of the last twenty years we are likely to be struck by the fact that it is

divisible into two almost equal periods during which the operating problems presented to railroad managements were quite different. It is just ten years since a great struggle between the railways and the brotherhoods of train service employees was terminated by the passage of the Adamson Act fixing eight hours as the working day upon which the compensation of train service employees must be based. This meant that thereafter overtime must be paid after eight hours' work. Three years later the Railroad Administration granted time and one-half for overtime after eight hours.

These developments have made it necessary for operating officers to regard very differently from the way they formerly did the average speed that freight trains make between terminals. Formerly it was assumed that the average speed made by freight trains was about ten miles an hour, and when complete statistics upon the subject became available this was found to be the case.

In 1920, the first year throughout which punitive overtime was in full effect, the average speed was 10.3 miles. The increase since then to an average of almost 12 miles an hour undoubtedly has been largely due to improvements in locomotives and other physical facilities and to changes in operating methods made to avoid punitive overtime.

One of the most marked differences between the ten years ending with 1916 and the ten years since then has been in the rate at which traffic has grown. Until 1920 both passenger and freight business largely increased. Since then passenger business has largely declined and freight business has increased at a rate nowhere near equal to that which was normal before the war, the result being that the growth of freight business during the last decade has been much less than during the preceding decade.

Gross Ton Miles Per Train Hour Best Measure of Performance

It is interesting to note how railway operation, as measured by the performance of locomotives, has been adapted to these changed conditions. The principal function of locomotives on our railways is to haul freight. Probably the best measure of their performance is the number of gross tons hauled one mile per train hour. This formula takes account of the weight of the cars and of the freight that is hauled, and also of the speed at which they are hauled.

No statistics regarding gross ton miles per train hour are available for years prior to government operation, but calculating upon the basis of the known numbers of cars and of tons of freight per train in 1906 and 1916, I have made some estimates which no doubt indicate with approximate correctness the increases in the efficiency of locomotives in hauling freight trains during the last two decades.

It would appear that gross tons per train averaged in 1906 about 881 tons and in 1916 about 1249 tons. This was a period during which the railways put forth great efforts to effect economies by increasing the average load of freight trains, but did little to increase their average speed. It seems reasonable, therefore, to assume that in both 1906 and 1916 the average speed of freight trains was 10 miles. On that assumption the increase in average gross ton miles per train hour between these years was about 42 per cent. The increase in the gross train load between 1916 and 1925 was from about 1249 tons to 1670 tons, or 34 per cent. The increase during this period in the efficiency with which locomotives were utilized in road service cannot, however, be measured merely by the increase in the average train load. Since the passage of the Adamson Act, and especially since the application of punitive overtime in train service, the railways have made great efforts to increase the average speed of trains, and it was increased from about 10 miles an hour in 1916 to 11.8 miles an hour in 1925. The resultant of the increases in the average train load and in average speed was an increase in gross ton miles per train hour from about 12,490 in 1916 to 19,679 in 1925, or 57 per cent.

These estimated increases of 42 per cent between 1906 and 1916, and of 57 per cent between 1916 and 1925 in gross ton miles per train hour are, of course, attributable, first, to improvements in locomotives and increases in their tractive power, and, secondly, to improvements in other railway physical facilities and in operating methods resulting in better locomotive utilization.

Gross ton miles per train hour have continued to increase this year, having in the first six months of 1926 averaged 20,196, or 5 per cent more than in the first half of 1925, and 62 per cent more than ten years ago.

It is an interesting fact that while the average tractive power of all locomotives increased less in proportion during the last decade than during the preceding decade, the amount of transporation produced hourly by the average freight locomotive increased more in proportion in the last decade than in the preceding one. The explanation undoubtedly is that the locomotives placed in service within recent years have shown more improvement than those installed in the preceding decade, and also that much more attention has been given within recent years to means of increasing locomotive utilization, the result being that the improved locomotive has been given a better chance to show what it can do.

The locomotive of today costs a larger price initially and more labor materials are required to maintain it, than the locomotive of yesterday. But it must be judged, of course, not merely by its capital, operating and maintenance costs, but by these costs in proportion to its production of ton miles per hour and also per day and per year. When it is judged by that standard it can easily be vindicated.

Only one-third of the locomotives now in service have been installed during the last ten years and only about 18 per cent of them have been installed since 1920. Nevertheless, the increase in average gross ton miles per train hour since 1920 has been 36 per cent while the reduction in the amount of coal consumed per 1,000 gross ton miles meantime has been about 16 per cent. There can be no doubt that the great improvement in operating results within recent years has been made possible largely by improved locomotives that have been installed within the last decade, and especially since 1920.

We who follow progress in the fields of locomotive development and railway operation without participating in them have been witnesses of a general rivalry between those on the one hand who develop specialties for locomotives and design and build them and those, on the other hand, who operate them on the railways. We have seen the former achieve rapid progress in improving locomotives. We have seen railway operating officers initiate new methods of getting more and better work out of locomotives. Both have been contributing to the marked increases that have occurred in the efficiency of railway operation and service. It seems not visionary to express the belief, in view of past experience, and especially that of recent years, that old locomotives may in future be more rapidly replaced with "the locomotive of today" and that methods of locomotive utilization may be still further improved, with

the result of effecting in future much greater proportionate increases in efficiency of operation and improvements of service than even those that have been accomplished during the last five years.

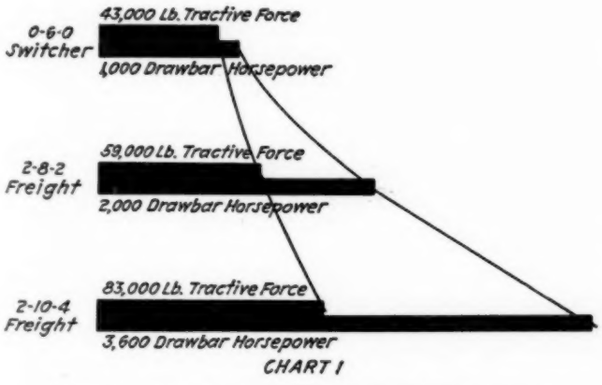
High Horsepower Output Cuts Operating Costs

By W. E. Woodard
Vice-president, Lima Locomotive Works, Inc., New York City

Gross ton-miles per train hour gives a more reliable index than any other single figure as to the rate at which railways are moving tonnage. It may be regarded as an index of the extent to which railways are utilizing their transportation plants. The railways of the country from 1922 to 1925 increased this figure 21.6 per cent and, what is even more significant, they did this with only a 7.6 per cent increase in total locomotive tractive power. This, truly, was a remarkable achievement and the members of this association in no small measure helped in the accomplishment.

To the locomotive designer and builder this splendid record is significant because it shows that power output is becoming more and more a requirement in fitting locomotive designs into railway companies' needs. While improvements such as better signalling, improved siding and yard facilities, as well as an increase in average car capacity, unquestionably provided some of the means whereby this increase was secured, the fact remains that it could only have been accomplished by a marked increase in the average drawbar horsepower output of the locomotives.

An example from a recent road test will illustrate



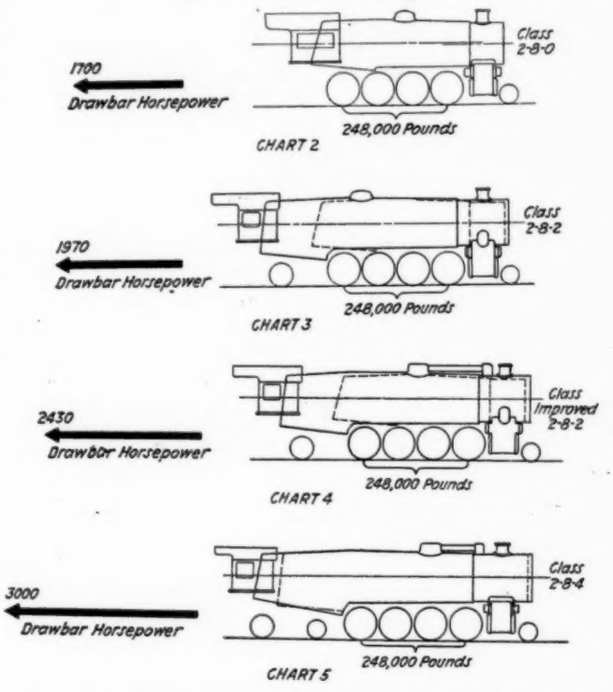
Comparison of Locomotives of Different Classes

how tonnage and speed affect this figure: a 2-8-2 locomotive handled 1691 tons in 46 cars over about 46 miles, much of it 1 per cent up-grade, at an average speed of 14¼ miles per hour. In doing this the engine developed an average drawbar horsepower of 1150. On the same day, over the same division, a 2-8-4 locomotive handled 2296 tons in 54 cars, at an average speed of 19.9 miles per hour. The average drawbar horsepower shown on the dynamometer car was 1784. The data is absolutely comparative, because the runs were made on the same day under the same weather conditions. The heavier train at the higher speed required 55 per cent more drawbar horsepower output. These figures are mentioned simply to illustrate what the demand for increased tonnage at higher speed means in terms of power output of the locomotive. These greater requirements often mean the use of a motive power unit of a different class in order to meet the traffic conditions without a sacrifice in tonnage.

Further Increase in Wheel Load Not Expected

In the study of this situation, there is one element which is of special interest, namely, the allowable driving-wheel loads. For the past few years the maximum allowable driver-wheel weight has not been increased, and there is no indication that it will be materially increased in the near future. Therefore, any improvement in the locomotive must come through a more intensive production of power per unit of weight.

In considering the present-day locomotive as a "moving power plant"—which it really is, we can omit from the discussion reference to variations in detail design and focus attention on the fundamental problem, which is—How can we obtain the increased drawbar horsepower which future traffic conditions will demand within existing driver-wheel weights, always keeping in mind locomotive fuel efficiency?



Steps in Locomotive Development Over Several Years

In order that we may get clearly in mind the meaning of the term "drawbar horsepower," I would like to point out the difference between horsepower and tractive power. Tractive power is the pull exerted by the cylinders at the rim of the driving wheels. If we substract from tractive power the pull required to move the engine and tender, we get drawbar pull. Drawbar horsepower is the rate at which drawbar pull is produced. For example (see Chart 1), a heavy six-wheel switcher having a tractive power of 43,000 lb. can produce 33,000 drawbar pull at 1000 ft. per min., or 11.2 miles per hour. This equals exactly 1000 drawbar horsepower. An average freight engine having a tractive power of 59,000 lb. will produce 33,000 drawbar pull at 2000 ft. per min., 22.6 miles per hour. This is 2000 drawbar horsepower. One of our biggest freight units having a tractive power of 83,000 lb. can produce 33,000 drawbar pull at 3600 ft. per min., or 41 miles per hour. This is 3600 drawbar horsepower. Note that the big freight engine will produce 3.6 times as much drawbar horsepower as the

switcher, whereas the maximum tractive power of the big engine is less than two times as much as the switcher. The big freight unit will produce almost twice the drawbar horsepower of the average freight engine, whereas its maximum tractive power is only 1.4 times as much.

While this comparison is made between locomotives of different classes, in order to bring out clearly the relation between tractive power and drawbar horsepower, the same thing is true to a lesser degree between locomotives of the same class. Maximum tractive power is no longer an index of the capacity of a locomotive to pull tonnage over a railroad. This statement is confirmed by operating results. From 1922 to 1925 the per cent of increase in gross ton miles per train hour (21.6 per cent) was almost three times the per cent of increase in the total tractive power of the locomotives (7.6 per cent). Beyond question one large element in this result was the more extensive use of modern motive power units in which the proportion of horsepower output to tractive power is far greater than in the older types of engines. If we wish, therefore, to find the value of a locomotive design for producing gross ton miles per hour, major consideration must be given to its drawbar horsepower.

I do not want to give the impression that we have discovered anything new when we talk about increasing the drawbar horsepower output of a locomotive. However, we now realize more clearly the importance of this factor in relation to railway operation, and it is only in recent designs that we have made a deliberate effort to improve this factor by changing some of the relations which existed in locomotive designs of the past.

Recent Steps in Locomotive Development

Up until a short time ago any increase in locomotive power capacity was secured by the use of well-known and existing combinations. How these steps progressed over a number of years past the following charts will show. Chart 2 shows a Consolidation locomotive of about 62,000 lb. per pair of driving wheels and its power output at 25 miles per hour. This general type of locomotive for a number of years was the standard freight unit of the country. As the traffic demands became greater, the same driving-wheel arrangement was used and the additional power secured by the application of a large boiler and trailing truck wheels, with the result that the well-known Mikado type was developed. This type of locomotive and its power output is shown on Chart 3, on the same driving wheel arrangement and load as the Consolidation. The response to the urge for more and more power was a design of the same general type, but with added steam generating capacity in the boiler, resulting from the use of type "E" superheater, feedwater heater, and other refinements of design. This power unit is shown on Chart 4, which is again superimposed upon the same driving wheel arrangement and driving wheel weight as the Consolidation. The last step consisted almost entirely of added boiler capacity and it practically exhausted the possibilities of using the well-known and existing elements of locomotive design for securing maximum power output on a given arrangement of driving wheels and a given driver-wheel weight.

The next step, and one which represents a number of locomotives now in use and being built, was to get more cylinder power into the same driver-wheel weight and furnish means in the boiler for supplying steam for this added cylinder power. This problem has been approached from two different angles by different builders. One method—which is now represented by 105 locomotives in use or building—is to increase the cylinder power by limiting the cut-off and raising the boiler pressure. This has the effect of keeping the maximum tractive power at about the same point or slightly higher than the older designs, but raises the drawbar horsepower at operating speeds in proportion to the increase in pressure. Such a design is shown on Chart 5, again superimposed upon the same driver-wheel arrangement and weight as the old Consolidation.

Added cylinder power output also can be secured by the use of three cylinders with a boiler of sufficient size to supply the cylinder requirements. The result is a similar increase in drawbar horsepower output.

Higher Boiler Capacity Essential

In these comparisons the part played by the boiler in increasing the power output is very apparent, and it is only through higher boiler capacity that cylinder power output can be increased. To the locomotive designer the problem of securing greater capacity in the cylinders is relatively easy; the real problem is to get boiler capacity to supply the increased cylinder requirements.

In this comparison of the four locomotives all upon the same driver-wheel arrangement and driver-wheel weight, I have used actual locomotives and eliminated the variable of driving-wheel load and arrangement, thus making the diagrams comparable. Most of the data is from actual dynamometer car tests and such few figures as have been calculated are based upon actual data, so that the power output is what has been and what is actually being obtained in service at 25 miles per hour.

From the Consolidation, the standard locomotive of a few years ago, to the modern 2-8-4, power output has been increased 76½ per cent without altering driver-wheel arrangement and weight. Here is one of the reasons why the railways could make the showing they did in gross-ton-miles-per-train-hour output from 1922 to 1925. How much improvement is still possible can be gathered from the number of older and smaller locomotives still in use. Of the locomotives assigned to freight service in 1925, about 40 per cent were Consolidations, almost all of them less powerful than the Consolidation I have shown in the diagram; 22½ per cent of all the freight power in 1925 were of the Mikado type, many of them not as powerful as the Mikado I have shown. With all due allowance for the needs of branch-line and pick-up service, these figures reveal the possibility of savings in operation by the substitution of new and improved motive power units.

The comparison has been made upon freight power, as the advance could be more easily traced in the classes of locomotives used in this service. The same principles of increase in power output are applicable to passenger locomotives, but in this line we do not seem to be as far advanced as we are in the locomotive for freight service.

I have confined myself to this rather elementary talk on locomotive power output because of the following reasons, which are a summary of what I have said:

A study of traffic figures clearly reveals a strong trend toward more tonnage at higher speeds; this means more gross ton mile output per train hour, which results in increased demands for power output from the locomotive units.

The allowable driving-wheel loads have remained and probably will remain about stationary. Logically, therefore, the line of progress is to get the greatest amount of power obtainable out of the existing driver-wheel loads.

The diagrams show what already has been done

"The Locomotive of Today" is being made to fit the operating conditions now being developed on the railways and such a locomotive can briefly be described as follows:

For a freight unit of 60,000 lb. axle load, a locomotive which will develop from 3,000 to 3,600 drawbar horsepower with a boiler of sufficient size to generate steam for this output at combustion rates of not over 100 lb. of coal per square foot of grate per hour. For lighter axle loads, a drawbar horsepower output in proportion to the allowable wheel loads, the maximum combustion rate remaining at 100 lb. of coal per square foot of grate.

This sounds simple. There are a few locomotives running which meet these requirements. This specification stands for the best freight units of the present day.

Improved Operating Methods Accompany Improved Locomotives

By A. R. Ayers

Assistant general manager, New York, Chicago & St. Louis, Cleveland, Ohio

From an operating standpoint, a locomotive must meet several conditions:

1—It must handle the required tonnage, or number of cars at the necessary speed.
2—It must do this with the minimum consumption of coal and water.
3—The first cost and cost of maintenance must be reasonable.
4—It must be capable of running long distances between terminal repairs.
5—It should be capable of performing service the maximum number of hours out of each twenty-four, in order that the number of locomotives required, and therefore the fixed charges on the capital investment, may be a minimum.

Freight of all kind is moving today at higher speeds than ever before; miles per car day increased from 25.1 in 1920 to 28.3 in 1925, or 10 per cent in five years, and we may expect it to keep on increasing, because it is well known that fast movement of freight is saving shippers large amounts money and is doing very much to stabilize industrial conditions.

And in order that operating costs may be cut down, this freight must be handled in large train units.

These things require a locomotive that will develop great power at high speed.

How well the builders and designers are meeting these conditions is shown by a comparison of a recent Mikado with one built in 1913; the later engine has only 17 per cent more total weight, but is about 40 per cent stronger at the start, 40 per cent at 20 miles per hour, 60 per cent at 30 miles per hour and develops 60 per cent more maximum cylinder horsepower. It will do nearly 60 per cent more work per pound of coal than the early design.

This progress has been accomplished by careful attention to locomotive design and continuous effort to burn fuel more efficiently, to use steam more efficiently, and to waste less of the exhaust steam and gases of combustion out of the stack. These efforts have given us superheaters, two-cylinder limited cutoff and three-cylinder locomotives, stokers, syphons, various forms of feedwater heating apparatus, special forms of grates, high pressure boilers, including several forms of water tube fireboxes, and many other features with which you are familiar in detail.

The Demand for Reliability

These added features are very much worth while, and are accomplishing remarkable results, but they have materially increased the amount of inspection and repair time and labor required at terminals.

In order that the full saving of these appliances should be realized and not dissipated in repair costs and loss of serviceable engine hours, it is highly essential that they should make the same mileage between general repairs that the main locomotive does, and that they should require comparatively little inspection and maintenance in the meantime.

This is one of the most important considerations in connection with the modern locomotive; locomotive designers and specialty manufacturers with their expert service men are unquestionably giving it much thought and effort, and there is no reason to doubt that they will accomplish the desired results. The extent to which automobile designers have met and solved the same problems is one of the reasons for the success of the modern automobile.

Locomotives today not only have a great many devices for increasing fuel capacity and economy but, as you know, commencing many years ago with valve gear, a great many details of construction have been improved mechanically, so that the locomotive today will run about twice as far between general repairs as it would 20 years ago, and the liability of failure is very much less.

Machinery parts, including cylinders, wheels, rods, frames, etc., have been lightened and strengthened by better design, and the use of high quality steels, and the weight saved in this way has been put into better boilers and fuel saving devices. New features are being developed constantly, and by continued attention to these things we can increase the capacity of the locomotive, increase the mileage between shoppings and cut down the amount of attention required in the meantime.

Correct Use One of the Greatest Problems

Assuming that the engine is well designed and built and maintained, all of which is pretty well done today, there remains the great problem of using it to the best advantage. This is one of the greatest problems of all, and one in which you are vitally interested; it is receiving most serious thought and attention from both transportation and mechanical departments.

Traveling engineers and traveling firemen may play a most important part in developing the loading and operating of modern high-powered locomotives to take full advantage of their capacity and economy. To do this, they themselves must have expert knowledge of the capacity of the machine, and must follow up the performance of the various special devices and instruct enginemen how to use them to the best advantage. In doing this they may, of course, receive much benefit from the locomotive and specialty service men who are experts in their particular lines.

We spend considerable money for devices that will save 10 to 25 per cent of the fuel, but it is a fact that can easily be demonstrated by actual test that poor firing or working the engine with wrong throttle and cutoff may easily waste from 10 to 15 per cent of the fuel. Light loading of trains is perhaps even more wasteful.

Four items that vitally affect the capacity and economy of the steam locomotive are cutoff, throttle opening, back pressure and draft.

If a steam locomotive is worked beyond 35 per cent to 40 per cent cutoff, the consumption of steam increases far beyond the proportionate increase in power; in other words, the engine becomes wasteful of steam.

Economies produced by two-cylinder limited cutoff engines and three-cylinder engines which are brought about partly, at least, by working steam at considerably shorter cutoff than ordinary practice, have caused us

to run a number of tests to determine whether our locomotives are being operated at or beyond the point of economical cutoff. During these tests the engines were operated under full throttle practically all of the time.

On some of these runs, it was found that the cutoff was over 40 per cent about seven-eights of the time, and on one run, which was a fast heavy tonnage train, the engine was worked over 50 per cent cutoff 89 per cent of the time; these engines were U.S.R.A. Mikados equipped with feedwater heaters and boosters.

To carry the tests further, the cylinder diameter on one engine was increased from 26 in. to 27½ in., and the maximum cutoff with reverse lever in the corner reduced from 90 per cent to 75 per cent. Handling trains of practically the same weight and speed as another engine of the same class, the modified engine was over 40 per cent cutoff only 39 to 43 per cent of the time, compared with 86 to 88 per cent of the time for the standard engine, and the modified engine showed only 3 per cent to 9 per cent economy in fuel and about the same in water; the saving was, of course, greater on heavier trains.

The Need for Improved Drafting

Much remains to be accomplished in developing means for producing the necessary draft on a locomotive without so much sacrifice of power due to back pressure.

The importance of back pressure is, of course, recognized, but may be emphasized by the statement that one pound of back pressure on a locomotive with 26-in. by 30-in. cylinders and 63-in. drivers at 35 miles per hour is equivalent to about 30 hp.

Somtime ago two Mikados were equipped with a device for automatically controlling cutoff according to back pressure, and these engines demonstrated that where maximum power is required there is considerable gain in power as well as economy by working with full throttle and with cutoff adjusted to keep the back pressure within reasonable limits. These limits will, of course, vary according to the type of engine, kind of fuel, etc.

Since that time, a number of locomotives have been equipped with back pressure gages, and the enginemen seem to be glad to have such gages on their engines, because the modern locomotive is so large that it is difficult for the engineer to operate it to the best advantage when relying only on his judgment assisted by the sound of the engine.

Feedwater heating devices in operation will reduce back pressure from 2 lb. to 4 lb. and on engines with large grates, automatic stokers, by carrying a thin, even fire, make it possible to get the maximum boiler capacity with less draft and consequently less back pressure than would be needed with heavy fires.

On large engines, the plain round exhaust nozzle does not appear to give as much draft per pound of back pressure as some form of nozzle which breaks up the exhaust jet and in this way provides more entraining surface for the front and gases.

Results of Improvements in the Locomotive and in Operating Methods

This is a subject of first importance in connection with locomotive operation today, and to show how far it can be carried it may be stated that engines which were formerly operated with 5¾ in. plain round nozzles are now in successful operation with specially designed nozzles having an area equivalent to a 6½ in. plain round, resulting in considerable increase in power, without any sacrifice of steaming qualities.

On one division where the size and type of freight power has been unchanged for four years, except that some of the later engines are equipped with boosters and feedwater heaters, the average tonnage per freight train in the direction of heavy traffic has been increased 360 tons with an increase in speed of about ¾ miles per hour. This figure is quoted to show what can be done partly by application of betterments and partly by attention to train loading and best methods of operating the locomotives.

Many notable examples of long engine runs on freight trains, as well as passenger trains, have been published in recent months. The modern locomotive is entirely capable of running several hundred miles on either passenger or freight trains without repairs, and the advantages of this practice are so many that there seems to be no doubt that it has come to stay, not only for oil-burners but also for coal-burners.

Among the advantages are the saving of fuel, otherwise wasted at terminals; saving in cost of terminal handling; better maintenance; more serviceable engine hours, and last but by no means least, the general speeding up of freight train operation through the elimination of most of the delays waiting for power, and the consequent incentive to the transportation department to make up its trains and handle its terminal yard work so as to take full advantage of the through runs.

As far as maintenance is concerned, the long runs force good maintenance, and at the same time make it easier, because long runs generally carry with them longer lay-over periods which afford plenty of time to do the necessary work on the engine, and this time is not always available on short runs with quick turns.

The great number of special devices on locomotives today has brought an enormous amount of piping and valves, so that railroads and builders are giving much thought to the problem of simplifying these things and, at the same time, making the engines more convenient and comfortable to operate. It is surprising how much good can be accomplished by a little study along these lines.

One feature of the modern locomotive that is justly receiving much attention today is the proper amount of fuel and water to be carried on the tank. On heavy freight trains, delays due to stopping for any cause must be offset by costly reductions in tonnage, and it is worth a great deal of consideration on any railroad to determine how much expenditure is justified in order to eliminate or reduce stops for fuel and water.

Possibilities of Future Development

If a satisfactory design of condensing steam locomotive can be worked out, not the least of its advantages will be the elimination of all stops for water on the road, and delays for boiler washing at terminals, in addition to saving of fuel and boiler maintenance expense.

Some progress has been made with locomotives of this type in Europe, but not much in this country on account of cost and the large size of locomotive involved.

The use of much higher boiler pressures with some form of water tube boiler construction appears to offer one of the most attractive fields for radical changes in steam locomotive design in the near future.

Discussion of the locomotive today would be incomplete without reference to electric and internal combustion locomotives. Both of these systems have the advantage of very high starting power and more serviceable hours per locomotive per day. In addition, the internal combustion engine has a lower fuel cost than the steam locomotive, and the electric locomotive is apparently somewhat cheaper to maintain, although some-

what restricted in its field of operation, on account of requiring trolley wires or third rail. The steam locomotive, however, still holds the great advantage of much lower first cost, and is making great strides in fuel economy and starting power.

No doubt all three of these systems will continue to develop rapidly according to the demands of the service in which they operate.

Some Important Details

By C. T. Ripley
Chief Mechanical Engineer, Atchison, Topeka & Santa Fe, Chicago

I shall confine myself to a discussion of the questions of design of the detailed parts of the locomotive and particularly to those features which need improvement on our present locomotives.

Let us first consider the firebox of the locomotive: The grates have been too often looked upon as a finished design. In recent years a number of roads, including our own, have been making an intensive study of the question of grate design and a large field for improvement has been found. I would like here to call attention to the development of the various designs of table grate. This change from the old finger grate is resulting in not only a fuel saving but in much lower maintenance cost. Better distribution of air through the fuel bed means easier and better firing of the locomotive. I am not sure but what a still further step in advance can be made by the introduction of alloy steel in these grates. In the case of oil burners there has been little change in design in the past 20 years, but studies are now being made as to different methods of introducing free air and it appears that by breaking up this air into a large number of small streams, better combustion can be secured.

Expansion Stresses in the Firebox

The greatest problem we have to meet in the large modern locomotive fireboxes with long combustion chambers, is that of staybolt breakage. The expansion and contraction of the sheets is so great that even the flexible staybolt does not entirely take care of the situation. Just how this is going to be met, I hesitate to predict. The double end flexible bolts may be of help but I am inclined to think that a more intensive study of the movement of the sheets may lead us to some changes in design which will prove of benefit.

The Front End—a New Viewpoint

Passing on to the front end of the locomotive we have a part which is most vital to both thermal and operating efficiency. There are entirely too many air leaks in the front ends. If a water test is put on the front end of an engine just leaving the shop it is surprising to find the number of leaks. We must do everything possible to close up these openings. If we can get rid of the superheater damper, and this is being done on many locomotives without apparent damage to the superheater units, we will eliminate one aggravating source of leak. Better designs of steam pipe casings are being installed. In some of these designs there is practically no chance for leakage.

There is also a tendency to put too much in the front end; we may perhaps learn from the European designers in this connection. The simplicity of their front ends is the most notable feature of their design. Intensive experiments during the past few years have shown us that we can greatly improve the drafting of the locomotive. The low nozzle stand and the large stack are working out very well. In the case of the nozzle itself, the common standard single nozzle has a distinct drawback in that cross fire of the exhaust from the two cylinders produces a hump in the back pressure line which means loss of power. To overcome this there has been developed a double nozzle which has two separate outlets for each cylinder. This results in the elimination of the increase in back pressure due to crossfiring. The engines are easier to fire and can handle more tonnage and save a small amount in fuel. This device is cheap to install and has no additional maintenance cost.

Too much water is carried over into the steam pipes of large locomotives, particularly those operating in bad water territory and equipped with feed water heaters. The superheaters are made to serve as evaporators and it is surprising to find the low steam temperatures existing at the cylinders in some of our locomotives. Some device is needed to take this water out of the steam. It has been accomplished abroad but on much smaller locomotives.

Frames and Moving Parts

The frames of the locomotives of older types are entirely too weak for modern service, and, as you all know, failures due to breakage have been common. These should be re-designed with larger sections and as engines pass through the shops they should be reframed. Unfortunately the designer has a difficult problem in figuring the stresses in frames. All the formulas are more or less empirical and the best guide we have is the record of breakages. It might be well in this connection to take strain gage readings on frames while in service. I believe this would develop the fact that certain portions of the frames are under-stressed and certain portions over-stressed. With this knowledge available we could redesign the frames with the proper distribution of metal. Proper cross bracing of the frames is extremely important in the prevention of frame breakage. The cast steel engine bed which is now being tried out appears to be a very promising development.

In the case of the cylinders our efforts should be directed toward reducing the weight of the moving parts and thus helping lubrication, wear, breakage of parts and proper counterbalances. Recent experiments indicate that we can cut the weight of piston heads, rings, etc., from 25 to 50 per cent. We should also cut the weight of the valve motion parts as much as is consistent with the prevention of breakage. It is possible that alloy steel may play an important part in this connection, although in the consideration of alloy steel we must always remember the difficulty of handling this material in railroad blacksmith shops as at present equipped. The future may change this equipment and thus meet this objection.

The Need of Cross-Counterbalancing

In connection with the counterbalancing of the locomotive the track stress tests which have been run in the past few years have developed a very striking fact, that is, the main wheels of our heavy locomotives are improperly balanced under the standard A.R.A. formula. The tests show that the hammer blow on the rail under the main driver occurs when the counterbalance is up, rather than when it is down. This shows that these wheels are not balanced even for revolving weights. The reason for this is that the plane of the counterbalance and of the revolving weights is different. There is, therefore, a moment developed which has been given

no consideration in the standard formula. The only correct way to counterbalance is to put a weight in the opposite wheel to take care of this moment. It may be of interest to you to know that a large Santa Fe type locomotive, when cross counterbalanced developed a practically zero hammer blow under the main driver at a speed of 45 miles per hour. The simplest way to approximate the same results is to add more counterbalance directly to each main wheel.

This study opens up a very interesting field for the designer. We are restricted by the track department to certain maximum loads per wheel. These restrictions usually are based on a combination of the static load and the dynamic augment or hammer blow. Now if by proper counterbalancing we can cut down this hammer blow we can increase the static load, thus we have an opportunity to develop the more powerful locomotive which requires higher axle loads without increasing the number of wheels. Incidentally we will get a smoother running locomotive which means lower maintenance cost.

The Driving Box Is Inadequate

One of the greatest weaknesses of our modern locomotive is the main driving box. You all know how quickly large locomotives develop a pound and what an expense it is to drop the wheels and correct the trouble. The fact of the matter is, the size of our locomotives has out-grown our driving box design. We have the main bearing on the top whereas the maximum pressure comes on the sides of the brass, due to the thrust from the rod. Now how are we going to meet this? As I see it, the most hope lies in the application of the floating bushing principle. Lubrication will, of course, be a problem but I believe it can be solved by the pressure system. There has already been a design of floating bushing developed for engine truck boxes and its performance promises very well.

In mentioning engine trucks I wish to call your attention to the importance of this part of the locomotive. Failures due to hot engine trucks are the most common of all lubrication failures. We have been guided too much by old designs. At the present time much work is being done in the re-designing of the brasses, eliminating the slot and oil hole from the top, carrying the oil to the lower part of the brass. Attention is also being given the fact that a large part of the heat originates on the hub face. In this connection a better type of hub liner is necessary. Here again the floating principle appears applicable and is being worked out at the present time.

Bigger sand boxes are needed on large power. On some of our large power we now carry 3½ tons of sand. If the engineer has a plentiful supply of sand he can better protect his machinery.

A Plea for a Central Testing Bureau

In the case of the larger fuel saving devices the mechanical engineer is greatly in need of help. The average railroad does not have the equipment to test out these devices properly. The only place to test these devices properly is on a test plant and only one railroad has such a plant. It is true we use dynamometer cars but the variables such as wind, weather, etc., make it almost impossible to draw entirely satisfactorily conclusions, particularly when the percentage of difference is small. There is only one real solution for this condition and that is the establishment of a central testing laboratory under the jurisdiction of the A.R.A. A recommendation for such a testing bureau has been made to the Executive Committee but so far it has not seen fit to adopt it, but I sincerely hope that the day will come when we will all have the benefit of such a bureau.

From time to time the work performed by existing locomotives is being increased; this is made possible by higher boiler pressure and application of capacity increasing devices. As a result they are moving heavier trains and in most cases at a higher rate of speed. The major part of the locomotive mileage in the next few years will be made with existing locomotives, consequently the major item of importance is to make the locomotives we now have a more reliable and more efficient machine. You who are continually in touch with the operation of these locomotives can be of a very great assistance in helping the mechanical engineer achieve these results. He must rely on you for first hand information as to these conditions. You should make every possible suggestion as regards changes which can be made to better locomotives. If your criticism is constructive he will certainly welcome it and you will be doing an important part in improving the design of the locomotive on your line.

Reliability, High Horsepower and Economy

By J. B. Ennis

Vice-president, American Locomotive Company, New York

We have at the present time, three distinct classes of locomotives, steam, electric and internal combustion. Since the advent of railroading in this country, the steam locomotive has been predominant, and still continues to be. While you men are primarily interested in the steam locomotive, it is needless to deny the advantages of any one of the three classes mentioned.

Within the past twenty-five years, the development of the electric locomotive in this country has progressed steadily and still, more recently, the internal combustion locomotive has entered the field and promises to remain with us. Certain conditions favor for safe and profitable operation the electric locomotive. Still others can be more advantageously met by the oil locomotive.

The electrification of a railroad division means an enormous investment as compared with steam operation which cannot be justified unless there are peculiar conditions particularly favorable to this method of transportation. Even then, the probable economies should be thoroughly investigated to make sure that the financial return will not be in doubt. Careful consideration should also be given to the possibilities of economizing and obtaining greater capacity by the use of improved steam locomotives where the investment would not be so great and the results can be forecast with reasonable accuracy. Unfortunately, comparisons have been made to prove the superior economy of electrification where they have been based upon steam operation with locomotives of old design, and in many cases, very light power. The modern steam locomotive has shown such an improvement in productive capacity and economy, even over locomotives of ten or fifteen years ago, as to warrant its continued use for many years to come for the general service of our railroads.

There are many difficulties in the way of providing an internal combustion locomotive to replace the modern high powered steam locomotive, although, ultimately, the problem will be solved if there is sufficient demand, and if it appears to be an economical necessity. Until this is done, large power in this class can only be obtained by the coupling together of two or more smaller units, and the use of multiple control, which is entirely

feasible. Our experience so far with this class of power has been confined to comparatively small units, mostly for switching service. Locomotives are now being built for branch line service of somewhat higher power and designs are being prepared for still larger units.

All of the oil locomotives so far built in this country for railroad operation have been constructed with electric transmission. Experiments are being made, both here and abroad, with other forms of transmission, such as hydraulic and mechanical, and the question of the most satisfactory drive is only one of the many problems yet to be solved. The great advantage of such a locomotive lies in the economy of fuel, the elimination of the boiler with its maintenance troubles, and the possibility of almost continuous daily use.

Thirty Years' Growth in Capacity

Coming now to the steam locomotive, I would like to read a paragraph from the proceedings of the Western Railway Club of March, 1894:

"The most encouraging thing, I think, that we have in the matter of compound locomotives, is the report from the Pennsylvania road, where they show at 70 miles per hour they have developed 914 horsepower. . . . . It is the greatest horsepower, I think, that has ever been reported at such a high speed."

That evidently represented a maximum locomotive of that time from the standpoint of horsepower. A few years later, in 1906, the statement was made at one of our Eastern railroad clubs by an earnest advocate of electric traction that electric locomotives then in service had developed a horsepower at the wheels of 2,500 to 3,000, something that never could be accomplished by the steam locomotive. Today, we have clearances very little in excess of those of thirty years ago, and yet our steam locomotive is a machine that develops more than 3,500 indicated horsepower. In fact, one of our largest freight road locomotives recently built developed in excess of 4,700 indicated horsepower.

This achievement has been a gradual one. It has not been easy and neither has it been accomplished through the efforts of the builders only. We have been assisted by heavier rails, better road bed, improved facilities, and have had the co-operation and encouragement of progressive railway management and motive power officers.

We have reached 96,600 lb. tractive force in a simple locomotive of the three-cylinder 4-12-2 type, giving a maximum horsepower of 4,750, and yet have been able to keep bridge and track stresses as low as in the case of smaller and less powerful machines operating in similar service.

Horsepower vs. Tractive Force

Several years ago, we were too apt to measure a locomotive in terms of tractive force only. The result was under-boilered locomotives, or locomotives that were too slippery to fully utilize the power. Today, we concern ourselves more as to sustained power or the ability to take heavy tonnage trains and keep them going at a good rate of speed. In other words, to produce more gross ton miles per train hour. If you will compare the results obtained in recent months with those of a few years ago in this respect, you will find a much greater increase in output of this character than the mere increase in tractive force would indicate.

As an example, I might mention the case of one of our eastern railroads on which a large number of freight locomotives were in service. They were built several years ago, but considered as very efficient and representative of their time. Last year, a new design of freight locomotive was developed in which the weight on drivers was increased about 13 per cent. A number of these locomotives were built and placed in service. They were of modern design in every respect and incorporated many of the successfully tried out features that help locomotive performance from the standpoint of power and economy. The maximum tractive force was increased 23 per cent and the application of a booster further increased this. A careful check was made of the daily performance of these new locomotives and records were established that had never before been equaled on this road. A comparison with previous performances of the older engines on a division approximately 140 miles in length shows that the average train load for a larger number of consecutive runs increased 29 per cent and that the average increase in gross ton miles per train hour was 78 per cent. In other words, for a 13 per cent increase in weight on drivers an increase of 78 per cent was obtained in the productive capacity of the locomotive. Even this statement does not really indicate the full advantage obtained as the locomotive mileage per month in this service has reached figures never before realized.

Recent Fundamental Improvements

Among the fundamental improvements recently made in this country in the steam locomotive through the co-operation of the motive power officers of the roads and builders might be mentioned the following:

Application of three cylinders, both simple and compound.
High boiler pressure now reaching 400 lb. per sq. in.
Limited cut-off.
Higher temperature superheaters.
Water tube fireboxes.
Large tenders.
Twelve coupled locomotives.
Improvements in details tending to give greater reliability with less maintenance.
Improvements in counterbalance and other conditions making for lower rail stresses.

As builders, we have been constantly aiming to advance the art. Each builder has his own ideas as to the particular characteristics of design that will best fit certain conditions and provide the most efficient machine. Each one has demonstrated under certain conditions that his theories were correct. It is perhaps best that this rivalry or pride in individual organizations exists. There is no doubt but what greater progress will be made in this manner, and it is safe to say that the ideas advanced by each builder are sane, and not thrown out for general use to the railroad operators until it has demonstrated that there is sufficient merit to warrant it. Each builder is trying to put out the best that he knows how from a designing and construction standpoint, in order to provide the maximum of efficiency, economy and serviceability.

The builders have, in a few cases, brought out for experimental purposes single locomotives designed with the thought of providing increased sustained power, greater economy in fuel, and greater reliability in service. These have demonstrated the possibilities of reducing operating costs through the replacement of obsolete and inefficient power. Few locomotives of old design will take care of increases in traffic, but they will not show the economies in operation that are shown by these improved designs.

A little more than three years ago, we were confronted with the problem of providing, in a given case, considerably more power within certain restricted clearances and weights than had been previously possible. At that time, there seemed to be only one way out of the difficulty and that was the introduction of a third cylinder. This was not new, having been unsuccessfully tried many years before in this country and, yet, more recently,

abroad with considerable success. There were many obstacles in the way, but we felt that the trouble heretofore experienced with this class of locomotive could be overcome. This first application was on an existing locomotive, and while the cylinders were made 3 in. smaller in diameter than in the case of the two-cylinder engine the maximum tractive force of the engine was increased from 54,000 to 64,500 lb. The same size boiler and firebox were utilized, and in order to provide for better steaming qualities and higher superheat a new design of superheater was installed.

The rebuilding of this locomotive demonstrated the practicability of the design and further proved that increased power could be obtained in this manner without involving greatly increased stresses. Since the completion of this first locomotive, we have furnished a total of 141 locomotives of the three-cylinder type. A considerably larger number are in successful service abroad. The performance of these locomotives has proved to our satisfaction that in general for the same weight on drivers, an increased hauling capacity can be obtained, varying from 11 to 20 per cent. The advantages, other than the increased power, are better balancing, better steaming of the boiler due to six exhausts instead of four, lower piston thrusts, fuel economy, and better effect on track. The maintenance costs, so far, do not indicate any appreciable higher amounts than those of corresponding two cylinder engines.

Thermal Efficiency Must Be Improved

The steam locomotive must be improved from the standpoint of thermal efficiency, in order to remain as it is at present—predominant in its field. Even though most of the locomotives now in service in this country are of the two-cylinder single expansion type, this does not mean that the steam locomotive of the future must be of that type. The fact that many years ago we tried compounding, and discarded it because of it complications, does not necessarily mean that we must be content with single expansion for the future. As a matter of fact, most of the fuel saving devices in use today were tried many years ago and many were discarded because the fuel economy realized at that time did not warrant the expense of arranging for systematic maintenance. This condition is different today. The high cost of fuel has made it of the utmost importance to devise some more efficient method of producing and utilizing steam for power purposes.

This has been particularly true abroad. Probably the most outstanding developments in Europe have been the use quite recently of high pressures, going up to 840 lb. per square inch, and the use of turbine condensing engines with moderately high pressure. Other features now being tried are uniflow cylinders, improved valve gears and poppet valves. Out of this experimental work will, undoubtedly, come some one or more successful fuel-saving systems that will not subtract from the general reliability of the locomotive and its fitness for continuous service, nor will it add materially to the maintenance cost. The ultimate possibilities of these experimental locomotives have not yet been proven, and it will take some time before we can assure ourselves of the reliability and maintenance cost as against fuel economy.

In this country, we are reaching for higher pressure. We have built one locomotive having 350 lb. pressure for the Delaware & Hudson, and are building another which will have 400 lb. pressure. The one in service has shown very satisfactory fuel records and, so far, without any excessive maintenance cost. It is of the two-clinder cross compound type with water tube firebox. We must look to the very high pressure boiler as a source of economy in fuel, and, undoubtedly, great strides will be made in this direction in the near future. Other methods of steam utilization may come with it in order to obtain greater economy.

While we are always striving for better things, we need not be ashamed of coal records from existing steam locomotives showing better than 2 lb. per indicated horsepower-hours and steam records of better than 16 lb. per indicated horsepower-hour. These are the results of refinement in design, of improved material, and better construction, and yet with all of this refinement we do not need to find excessive complications and high maintenance. We have freight locomotives today giving better than 9,000 miles per month in regular service and passenger locomotives giving still more.

Other Things Needing Improvement

Features of lubrication are now being well looked after on our locomotives better than ever before. We must realize a machine of great power operating under the conditions that exist on the railroads of today must be well lubricated in order to remain in motion. Too little attention has been given to this in the past and there is yet a great opportunity for improvement in this particular.

Some advance has been made in the use of better materials for locomotive details. And, yet, there is probably no one item that will need more attention than this, in the future. We have had entirely too many failures of important locomotive forgings, taking out of service locomotives that otherwise could have been utilized. While we must have materials that will give us minimum weight, still more important is the material that will last until worn down to the safe limit.

In slow speed service where the demands on the boiler are not great, a locomotive having a high percentage of weight on drivers, such as the Consolidation type, has worked out very satisfactorily. Where speed is an important consideration, combined with high sustained drawbar pull, greater boiler capacity is required, and we often find it impossible to obtain this within the allowable limits of driving wheel weights without resorting to trailer trucks. The quality of fuel determines the amount of grate area. No fixed standards can be applied. Large grate areas are essential in some cases to insure economical rates of combustion. Standby losses must be considered, however.

The steam locomotive is still handicapped to a large extent by too much back pressure caused, in some cases, by too small boilers or fireboxes, and also due to other factors. In order to improve this condition, experiments have been made with fan draft and while, so far, the results obtained have not warranted any general adoption of this method of producing draft, there is ample field for development work in this direction with promise of satisfactory results.

More attention than ever is being given in the design of locomotives to the convenience and safety of cab fittings and the comfort of the engine crew. The importance of this is fully realized, especially on large power, and recent reports from enginemen indicate that this is being accomplished in a satisfactory manner.

The Steam Locomotive of Tomorrow

What of the steam locomotive of tomorrow? And how will it differ from the one we have today? Materially higher pressures will be used without any sacrifice of safety, and with greater economy. Reciprocating engines will be used until turbines prove their superiority which, if they do, will take considerable time. Valves and valve gears may be changed in principle from what

we are now using, and the steam produced more economically will have to be utilized more economically. Two and three cylinders will be used, both simple and compound, and the possibilities of limited cut-off will be further developed. Superheat will be increased. Back pressure will be reduced; better materials will be used; maintenance will be systematic, not spasmodic, and the locomotive designed so that running repairs can be quickly and easily made, and general repairs only after satisfactory mileage has been obtained. Better means of lubrication will be provided so that in all, greater economy and reliability will be produced and the records of today, good as they are, will be eclipsed by those of tomorrow.

The railroads will decide, after all, just what the locomotive of tomorrow will be. The builders are prepared to develop and build it for them. You men have a great influence in determining the answer to this problem. The successful utilization of the locomotive depends, in a large measure, on you. While the builders are striving for increased efficiency, it can only be realized by zealous effort on your part in perfecting the technique of operation. On you devolves the duty of instruction in approved methods, if maximum economy of operation and maintenance is to be attained. Without your co-operation, the most efficient product of the builders can make only an indifferent showing. Your assistance has been of great value to us in the past and we now ask that it continue so that we may build as the locomotive of the future only that which represents the ideal from the standpoints of safety, minimum stresses on track and bridges, maximum output per unit of time, low fuel cost, low maintenance cost, and convenience and comfort for the engine crew.

Other Addresses

W. L. Bean, mechanical manager of the New York, New Haven & Hartford, emphasized the need of augmented superheating surfaces with increased cross section of gas and steam passages, more extensive use of feedwater heating, mechanical stokers on heavy power, integral steel castings to reduce weight and minimize the number of locomotive parts connected by bolts, nuts, keys, rivets, etc., and higher steam pressures with water tube boiler construction.

Mr. Bean said the high power locomotive of the future will have, among other important features, higher boiler pressure, an improved superheater, larger grate area, and better grate design, larger firebox volume, special devices for promoting the circulation of water, ample steam storage space and water surface for steam release, outside dry pipe and front end throttle, superheated steam for stoker engines and other auxiliaries, limited cut-off, booster, back pressure gages and a pyrometer. Special care will be taken to eliminate air leaks in smoke boxes. Maximum tender capacities for water and coal will be provided.

John E. Muhlfeld, who has just returned from an extensive study of motive power and economic conditions in Europe, held the interest of the association members throughout the reading of an extensive paper outlining his observations while abroad. Mr. Muhlfeld's address was replete with humorous anecdotes and straight-from-the-shoulder comments on American practice. He said that after a century of service, the steam locomotive is still the premier motive power unit and will be for several generations to come. His observations of gasoline and gasoline-electric power while abroad indicated that in spite of the use of this type of power, foreign cities still have their smoke problems, the major part of smoke in cities not coming from locomotives but from industrial plants. He stated that if 15 per cent of the smoke in large cities is chargeable to steam locomotives, electrification might reduce that percentage one per cent but hardly more. Mr. Muhlfeld commented on the cost of transportation by canal as compared with railroads and advocated a national program for the full utilization of the country's water supply for irrigation and land improvement projects only. In closing he called attention to the need for a centrally located locomotive and car testing plant supervised by the American Railway Association and available to all roads. This will overcome the difficulty in securing definite scientific information regarding the actual performance of present locomotives and auxiliaries. The information obtained at this test plant used in conjunction with dynamometer car data will be very beneficial and contribute to doubling the thermal efficiency of the present locomotive.

A. G. Trumbull, chief mechanical engineer of the Erie, devoted his remarks to a study of the trends of development which have recently become most marked in locomotive design and after pointing out the present direction of these trends, ventured a few predictions as to the direction future developments were most likely to take.

With respect to the boiler, he commented on the recent trend towards larger grate areas and drew attention to the fact that the larger crate area is accompanied by increased firebox volume. This, in his opinion, offered the greatest opportunity for improvement in boiler capacity and efficiency still available. He supported his views as to the future possibilities in the locomotive by a chart showing a comparison of water tube stationary boiler development in 1905, 1910, and 1915. In 1905 these boilers developed in ordinary service 125 per cent of their rating, while in 1910 with stokers and 8 per cent more furnace volume per pound of coal burned per hour the ordinary output had increased to 175 per cent of the rating, and in 1915 with a further material increase in furnace volume the ordinary output had increased to 225 per cent of the rating. Although recognizing that some responsible engineers are predicting locomotive boiler pressures as high as 600 lb., he expressed grave doubts as to the practicability of any such pressures, even with suitable boilers of the water tube type. One reason for this belief is the fact that the increased economy from increased boiler pressure becomes progressively less as the pressures grow higher and another is the difficulty which he anticipates in handling such high pressures in a locomotive boiler, even of the water tube type. Mr. Trumbull belives that a return to compounding will be necessary because of the inability to expand steam through the wide range required by such high pressures in a single stage. Mr. Trumbull then described as the best high duty locomotive for the present, one with a boiler of the conventional type with large firebox volume and a steam pressure of from 225 to 250 lb. with a limited maximum cut-off, equipped with a booster for additional adhesion in starting, this locomotive to be operated at a back pressure predetermined to give its maximum power output. The locomotive of the future, he said, would have a water tube boiler with steam pressure up to 350 lb., this high pressure steam to be used in compound cylinders.

O. S. Jackson, Superintendent of Motive Power and Machinery of the Union Pacific, said that rail transportation has progressed only as fast as locomotive development, and to show the extent to which that development has gone he compared the capacity in ton miles per train hour of the heaviest freight locomotive on a repre-

sentative division of the Union Pacific in 1903 which was 13,500, with that now obtained from the new 4-12-2 type three-cylinder locomotive which is 80,000, unit earning capacity of six to one. Mr. Jackson expressed the belief that the limited maximum cut-off, two-cylinder locomotive and the three-cylinder type are the two developments which at the present time offer the broadest and surest field for immediate progress in improving the steam locomotive. The water tube boiler, he said, would probably have to fight hard for recognition because of prejudice in regard to what constitutes a locomotive boiler. Referring to the 4-12-2 Union Pacific type locomotive which by the addition of one driving axle and of the increased traction per axle made possible by the three-cylinder arrangement has increased the tractive force as compared with former 2-10-2 type locomotives by 44 per cent, Mr. Jackson said that this locomotive is pulling the same tonnage as Mallet locomotives on a 1.55 per cent grade between Cheyenne, Wyo., and Laramie at an increased speed with reduced fuel consumption. On the 0.8 per cent grade between Laramie and Evanston, he said this locomotive has demonstrated its ability to produce 80 per cent more ton miles per hour than the Mallet locomotives, both engines having equal starting tractive force, and to do this on slightly less than half the coal per thousand gross ton miles required by the Mallets. With 48 per cent cut-off operating at 42 miles per hour it has developed 4,750 hp. The future, Mr. Jackson said, offered two prolific lines of economic advancement in locomotive development and operation, one of which is the obsolescence of light and uneconomical locomotives and the second the maximum utilization of legitimate motive power. We cannot, he said, afford to perpetuate obsolete power.

Committee Reports

During the convention committee reports on the following subjects were presented and discussed: Smoth Train Handling, Instructions for New Firemen, Locomotive Availability and Revision of Progressive Examination Questions. Papers were also read on the Booster, Automatic Train Control, and on the Traveling Engineers' Growing Job.

Proposed Lease of L. & N. E.

WASHINGTON, D. C.

THE application of the Reading to the Interstate Commerce Commission for authority to lease the Lehigh & New England for 999 years was vigorously opposed by the Pennsylvania and supported by the Baltimore & Ohio at the hearing before C. V. Burnside, assistant director of the Commission's Bureau of Finance on September 9. The New York, New Haven & Hartford also participated in the hearing to suggest that the commission, in any order it may make approving the lease, should afford permanent assurance that the route shall always be kept open to any of its connections as a gateway to New England via Maybrook, N. Y. The Western Maryland, which had intervened in the case, withdrew its opposition after W. L. Kinter, general solicitor of the Reading, had formally suggested that the commission include in its order a condition that all through routes and joint rates via the Lehigh & New England be maintained unless changed by agreement of the interested carriers or by order of the commission. For the Pennsylvania, however, it was stated that such a condition would not meet the situation and that is need for an additional route to New England as an alternate to the New York harbor route, could only be met by a participation in control of the L. & N. E., which it was suggested should be divided between the Reading, Baltimore & Ohio, New York Central and Pennsylvania.

Following the testimony of Agnew T. Dice, president of the Reading, which was briefly reported in last week's issue, more detailed testimony in support of the application was given by C. H. Ewing, vice-president in charge of operation, and E. G. Hilleary, vice-president in charge of freight traffic, and others.

E. G. Buckland, vice-president of the New Haven, then took the stand and explained the vital interest of his company and of the New England situation in the maintenance of the routes via the New York harbor and via Maybrook. Because of the danger of congestion of the New York route, he said, the New Haven would view with alarm any policy that would tend to close its Maybrook gateway to any of its connections, of which the Pennsylvania is perhaps the largest, and that while he had great confidence in the management of the Reading, he questioned whether there should not be some assurance that would be binding on future managements that the route would be kept open to all comers on reasonable terms. He said that New England is interested in the physical development of the L. & N. E. route and that it might be to the interest of the Reading to attract all possible traffic to that route, but he suggested the possibility of a change in the control of the Reading.

A. J. County, vice-president of the Pennsylvania, said that that company had been negotiating for ten years with the officers of the L. & N. E., and of the Lehigh Coal & Navigation Company, which controls it, for an opportunity to purchase an interest in the road and to build a joint line connecting the Pennsylvania lines north of Harrisburg with the L. & N. E., at a point near Tamaqua, Pa., in order to develop an alternate route for Pennsylvania traffic into New England and broaden the market for the coal company's anthracite. He proposed that an arrangement be made for joint control of the L. & N. E., by the four companies principally interested, saying he had no hope of meeting the necessities of the situation by anything short of participation in the ownership and that the Reading, by the proposed lease, would have control not only of the L. & N. E. route but also of the Lehigh & Hudson River, because of the ownership of stock in the latter by the coal company, the Reading and the Central of New Jersey. In view of the relation of the Baltimore & Ohio and New York Central to the Reading, he said, the Pennsylvania must view such a result with apprehension.

Daniel Willard, president of the Baltimore & Ohio, which had filed an intervening petition the second day of the hearing, said that the lease would be of advantage to the Reading, to the public and to the Baltimore & Ohio, even if the latter were not a stockholder of the Reading. Substantial economies could be effected and the method of handling traffic to New England could be improved. The Pennsylvania, Mr. Willard said, has practically an exclusive connection with the New Haven via the New York Connecting road and the New York Central and Erie have direct connections with New England lines, while the Baltimore & Ohio, which is in competition with them, has not, and freight over the 285 miles between its rails and the Maybrook gateway is handled by four railroads. Anything that will tend to simplify the handling of the Baltimore & Ohio traffic to New England will be beneficial to the Baltimore & Ohio, he said, and he was inclined to surmise that one of the principal reasons for the opposition to the lease was that it would strengthen the Baltimore & Ohio.

Welding Battered Joints Has Effected Economies

An investigation of the extent to which this work is carried on shows that it is regarded favorably

THE reconditioning of rail in track by the building up of chipped and battered joints has proved so successful from the standpoints of both cost and service that it has come into extensive use on the railroads of this country, the increase in the practice being particularly marked during the last few years. With the exception of the necessity for providing heavier rail to meet the demands of heavier power and increased traffic, the principal cause of the renewal of rail in main lines is due to the battering at the joints, thus causing rough riding track on rail that is otherwise capable of considerably more service in its original position. Aside from welding, the methods by which rail with battered ends has been made serviceable for further use in main lines or important secondary lines has been either by sawing off the ends or by re-rolling, each of which proc-

Welding Battered Joints on Main Line Rail

esses involves removing the rail from the track, transportation to and from the mills and loss of material from cropped ends, beside the cost of the sawing or re-rolling itself.

With the rapid increase in this method of building up rail it was felt that a survey of what is being accomplished and the methods pursued on the large mileage of roads which are using this process will not fail to be of interest to all who have to do with the upkeep of track or to those who are responsible for economies in maintenance. To obtain the information questionnaires were sent to the large roads of the country asking as to the extent to which this work is being carried on and the results obtained, together with such other information, based on their experience, as would be of interest. Replies were received from 44 roads, with a total of 176,000 miles of lines, and indicated that to date a total of approximately 2,200,000 joints have been built up, at an approximate cost of $1.48 per joint. These figures, which are admittedly incomplete, since a number of the roads have not kept cumulative records of the joints welded, compare with a total of 598,231 at a cost of $1.58 per joint, reported by the Committee on Rail in its report to the American Railway Engineering Association at the 1925 convention, and indicate that the increase in the amount of the work has been accompanied by reduced costs.

Early Work in Welding Joints

The building up of worn frogs and crossings on the steam roads by welding dates back to 1913 when the Pacific System of the Southern Pacific repaired by this process two track crossings located in busy industrial tracks. The work was so successful and the advantages of the method for this class of work were so obvious that it soon came into extensive use. The application of the process to the building up of battered and chipped ends of rail in track appears to have begun on the Central of Georgia in the latter part of January, 1917, where it was in use when the railroads were placed under federal control. The resulting economies were so great that B. L. Winehell, director of the Southern region for the Railroad Administration, issued a circular in July, 1918, calling attention to the method and outlining its advantages, the circular arousing much interest in the subject and eliciting many requests for further information. During 1918, the Pacific System of the Southern Pacific, which had been welding frogs and crossings in track for five years, extended its welding operations to rail as a means of combating the labor shortage and high prices due to the war. Its experience with the 5,000 joints which it built up during 1918 was so satisfactory that it increased its activities to such an extent that today each operating division has gangs of from 2 to 14 men engaged in the work.

During 1918 the Atchison, Topeka & Santa Fe and the Atlantic Coast Line inaugurated the practice and it was adopted by the Union Pacific in the following year. Other roads put the method into operation after periods of experimentation, the greater number of them in the last four or five years. The Baltimore & Ohio, the Chicago & Alton, the Colorado & Southern and the Seaboard Air Line have been doing the work for a year or less, while the Boston & Maine, the Southern and the Wabash report that they are now considering the matter.

Rail Is Not Injured by Welding

When the method was first introduced many doubts were expressed as to the safety of the process, due to the general idea that the heating necessary to make the welds would have an injurious effect upon the molecular structure of the rail. It is interesting to note that the same doubts were expressed as to the safety of the gas welded bond when it was introduced in track circuits for signaling. The careful inspection of the welded rails in service, supplemented by laboratory tests, has failed to support these fears when the work has been done properly and confined to that portion of the rail within the limits of the angle bars, this limitation being practically universal on the roads which are building-up joints. This freedom from failure confirms the studies of the Committee on Rail of the American Railway Engineering Association which investigated and reported on the effects of gas welded rails in 1925 and which stated as its conclusion that "rail breakage appears to be confined to cases in which

the bonds have been welded to the web or the base of the rail outside of the joint structure."

In the early use of welding some driver burns outside the limits of the angle bars were built up, and while there is no record of any failures due to this practice it was generally considered unsafe and the rails so built up were replaced as a matter of precaution and the practice discontinued. Another practice which has been discontinued is that of burning holes through the web of the rail to avoid drilling, since rail end failures have been traced directly to such holes, where investigations have shown that incipient cracks were present around the burned holes. As explaining this condition the theory seems sound that the expansion and contraction in the metal surrounding the hole set up stresses which cause the cracks, while the ends of the rails, being free to expand and contract without restraint, were free from such stresses.

All of the roads reporting state that they have found no evidence of injury to the rail from welding when proper precautions are taken. The Chicago, Burlington & Quincy, in order to satisfy itself as to the influence of welding on rail end failures, has issued instructions that in the event of a rail end failure or bolt hole break the failed rail report must show whether or not the rail end has been welded, and during the period of a year since these instructions have been in force no such breaks have been reported on welded rails.

Methods of Welding

While welding may be done either by the oxy-acetylene torch or the electric arc, all but two of the roads reporting use only the oxy-acetylene process. The Southern Pacific (Pacific System), in addition to numerous oxy-acetylene outfits, has two semi-portable electric outfits used primarily for building up joints in paved streets and is now building two modern electric machines, mounted on flanged wheels and capable of traveling to remote sections of its lines. The Western Pacific, which used both processes, is now using the electric process exclusively.

As may be expected, the cost varies between rather wide limits from a minimum of $1 or less per joint to a maximum of $2.88 in some exceptional cases although the tendency is now to change out the rails when the cost of building up the joints will amount to $2.50. The amount of work done, as well as the organization of the forces, naturally has an influence on the cost and on the roads which are doing the work on an extensive scale the range is from $1 to $1.75.

Name of Road	Mileage	Are Joints Welded?	Yrs. Welding Done	Method Used	No. Joints Welded	How are Joints Selected?	In Track Long Periods Of Time	Minimum Amount of Batter Welded	Organization: Gang (e=welder; h=helper)	Organization: System or Division	Organization: No. of Gangs	Results of Work	Increase in Life of Rail	Any Evidence of Injury to Rail	Cost Per Joint Including Labor and Material	Remarks
A.T.& S.F.	12,043	Yes	8	Oxy-Acet.	120,000 in 1925	Inspection	Yes	1/16"	2-e,1-h		40	Very Satisfactory	22% in First Position	No	$1.26	Gangs are assigned to each asst. gen. mgr. territory
A.C.L.	4,031	Yes	8	Oxy-Acet.	No Record	Chipped Ends	No		1-e,4-h	Div	3	Generally Satisfactory	Undetermined	No	40 to 50 cts.	
B.& O.	5,197	Yes	1	Oxy-Acet.	3,000	Inspection	No	1/16"	1-e,1-h	Div.	8	Welds have stood up	Undetermined	No	1.00 to 1.50	
B.& A.	406	No														
B.& M.	2,248	No														Considering the subject
B.R.& P.	602	Yes	2	Oxy-Acet.	2,000	Inspection	No		1-e,1-h	Sys.	4.	Welds Stand Up	Undetermined	No	1.42	Temp joints replace worn anglebars and tighten bolts before welding
Can.of Ga.	1,021	Yes	9	Oxy-Acet.	11,500	Inspection	No		1-e,1-h	Div	5	Weld Failures less than 5%	Undetermined	No	1.75	Welding gang also replaces frog bolts,etc.
C.R.I.& P.	691	No														
C.& A.	1,082	Yes	1	Oxy-Acet.	6,400	Inspection	Yes	1/16" to 1/8"	2-e,1-h	Div	3	Satisfactory	3 to 5 Yrs expected	No	1.20	Welding is confined to rail 5 Yrs. or more in track
C.& E.I.	945	Yes	4	Oxy-Acet.	20,000		Both		1-e,1-h	Sub-Div	3	Very Satisfactory	About 3 Yrs	No		Select trackmen, usually foremen for welders. Gangs replace frog bolts, etc.
C.& N.W.	8,487	Not Now	5	Oxy-Acet.	30,000	Inspection	Both			Sub-Div	None Now	Not Determined	Not Determined	Not Yet	2.00	Question economy of welding
C.B.& Q.	9,404	Yes	5	Oxy-Acet.	95,000	Inspection	Yes	1/16" or chipped	4-e,1-h	Sys	7	Generally Satisfactory	4 Yrs.	No	1.25	Renew worn anglebars and examine rail for defects when bars are changed
C.G.W.	1,498	Yes	3	Oxy-Acet.	2,500	Inspection	Not as a rule			Div.	1	Very few weld failures	About 3 Yrs.	No	2.00	
C.M.& St.P.	10,784	Not Now		Oxy-Acet.	4 or 5 Ml.		Yes				None Now	None	None	No		Have not been able to develop any saving by welding
C.R.I. & P.	7,884	Yes	2	Oxy-Acet.	6,000	Inspection	No	1/16"	1-e,1-h	Div.		No weld failures	Not determined	No	0.75 to 1.25	
(Western Road)	8,000	Yes	8	Oxy-Acet.	70,000		No			Div.	2	Good	About 5 Yrs.	No	$2.00	
C.& S.	1,057	Yes		Oxy-Acet.												Just starting work. Have no data to furnish
D.& R.	896	Yes	4	Oxy-Acet.	700	Inspection	No	1/8"	1-e,1-h	Div.	4	Very Good	Possibly 30%	No	1.69	Welding gangs work mostly on frogs and switches
D.L.& W.	993	No														
D.& R.G.W.	3,577	Not Now		Oxy-Acet.	6,000	Inspection	No		1-e,2-h	Sys.	2	Good	Approx.2 Yrs	No	1.50	Work done in 1924
Erie (New York Region)	1,090	Yes	2	Oxy-Acet.	No Record	Inspection	No	3/16"		Div.		Good	No data	No	0.90 to 2.00	
Erie (Ohio Region)	977	Yes	3	Oxy-Acet.	15,000	Inspection	Partly		1-e,1-h	Sub-Div		Less than 1% Weld Failures	2 Yrs.Main Line	No	1.88 to 2.04	Worn anglebars are changed before welding
G.T.W.	992	Yes	8	Oxy-Acet.	2,500	Inspection	Yes			Sys.	1	Good	Possibly 5 Yrs.	No	1.70	
G.N.	8,222	Yes	5	Oxy-Acet.	210,000	Inspection	No	1/16"	2-e,1-h	Div.	21	Satisfactory	2 to 5 Yrs.	No	1.75	Joints are tamped a few days in advance of welding
I.C.	6,207	Yes	5	Oxy-Acet.	125,000	Inspection	No			Div.	12	Satisfactory	2 to 5 Yrs.	No		Temp joint and change worn anglebars before welding. Change rail where cost of welding exceeds $2.50 per joint
L.V.	1,364	Yes	4	Oxy-Acet.	500	Chipped Ends	No			Div.	Varies	Very Good	Undetermined	No	2.00	Have found it necessary to weld only a few rails
Long Island	397	No														
L.& N.	5,038	No														
M.C.	1,662	No														
M.St.P.& S.S.M.	6,404	Yes	4	Oxy-Acet.	10,000	Inspection	No	1/16"		Sys.	3	O.K.	30%	No	2.00	Rail laid prior to 1910 not welded
M-K-T	3,186	Yes	4	Oxy-Acet.	15,000	Inspection	No	1/32"	1-e,1-h		5	Satisfactory	3 to 4 Yrs.	No	1.10 to 1.60	
N.C.& St.L.	1,260	Yes	9 No.	Oxy-Acet.	2,000 to April	Judgment of Welder	No	3/64"	1-e,1-h	Div.	3	Satisfactory in most cases	Not Determined	No		Weld failures that have occurred have been on very soft rail
N.Y.C.	8,710	No														
N.P.	6,049	Yes	2	Oxy-Acet.	700	Inspection	1		1-e,1-h Appr.	Div.		No apparent failures	No data	No	1.00 to 1.50	Very little work has been done on rail
(Western Road)	2,300	Yes	3	Oxy-Acet.	28,000	Inspection	No	1/8"		Div.	6	Practically no failures Fairly good	Not determined	No	1.94	Saves maintenance cost and provides better riding qualities
P.M.	2,060	Not Now		Oxy-Acet.	2,000										2.25	Experimented in 1922 and 1923
St.L.-S.F.	4,982	Yes		Oxy-Acet.	6,977											
St.L.S.W.	1,777	No										Very Satisfactory to date	No data	No	1.15	Doing little at present. Work was done in 1923 and 1924
S.A.L.	3,999	Yes		Oxy-Acet.												Have done too little to furnish data
Southern	8,111	No														Have experimented and are considering
S.P.(Pac.Sys.)	8,758	Yes	8	Oxy-Acet. and Elec.	329,583	Inspection				Div.		Very Satisfactory	3 Yrs.	No	1.20	Using oxy-actylene now principally but building some electric machines
S.P.(La.& Tex.	4,810	Yes	2	Oxy-Acet.	6,500	Inspection	No		1-e,1-h		3	Satisfactory	No Data	No	1.00	Gangs work principally on frogs and switches,worn joints are replaced before welding
U.P.S.R.	3,691	Yes	7	Oxy-Acet.	228,435 (948,553)	Inspection	Yes	1/16"	(1-e,1-h) (2-e,3-h)			Less than 5% Weld Failures	2 to 4 Yrs.	No	1.00 to 1.20	Joints are tamped and worn anglebars replaced before welding
U.P.System Nebeah	2,822	No														Considering the subject
W.P.	1,042	Yes	5	Oxy-Acet. and Elec.	20,793	Inspection	No	1/16"				No Weld Failures	No Data	No	1.55	All welding now being done by electricity

Data from Various Roads on Welding Battered Joints

All of the roads engaged in welding report that the results are satisfactory, both in the improvement in the riding qualities of the track and in the lengthening of the life of the rail. Few failures of welds are reported where the method has been in use some time, most of the failures occurring when the work was being inaugurated, due usually to inexperience. Few roads report weld failures amounting to more than five per cent of the total joints welded while some report as low as one per cent.

The increase in the life of rail due to welding varies, of course, with traffic conditions but on the roads where the practice is in extensive use a marked increase in life has been noted, ranging from two to six years. The Baltimore & Ohio, which has been welding only a year, reports that while it cannot yet determine the increase in the life of the rail, the higher standard of joint maintenance is very noticeable.

In contrast with the rapid extension of this practice on most roads, the Northern Pacific states that a large proportion of the rail in its main line is 90 lb., which it is not desired to maintain beyond its normal life, owing to the demand for good relayer rail for branch lines or new construction. When the 100-lb. and 130-lb. rail, which is now being laid in main track, develops battered joints it is thought likely that the practice of welding will be adopted. Similarly, the Chicago, Rock Island & Pacific believes there is no economy in attempting to prolong the life in the first cycle of service of rail of lighter section than it is expected to maintain in the track, other than to build up occasional battered joints.

Railroads Present Plan for Terminals at Los Angeles

Comprehensive program would utilize present station sites and provide grade crossing elimination

THE long continued agitation and litigation concerning a union station at Los Angeles, which the Railroad Commission of California has been attempting to secure, will be drawn to a close if the plan presented by the four railroads interested (the Southern Pacific, the Atchison, Topeka & Santa Fe, the Union Pacific and the Pacific Electric) is adopted. This plan, which is endorsed by the Business Men's Association of Los Angeles, as furnishing a definite program which will best serve the interests of the city, provides for the continued use of the Central Station by the Southern Pacific and the Union Pacific, and the use of the same station by the Pacific Electric for through passengers for the steam roads; the replacement of the present Santa Fe station by a modern station and the construction of an elevated line between Sixth and Seventh streets from the present terminus of the Pacific Electric's elevated line near San Pedro street to a point east of the Los Angeles river which will be used jointly by the Southern Pacific, the Union Pacific and the Pacific Electric and which will remove all interurban traffic from the streets of the downtown streets, as well as the Southern Pacific traffic in Alameda street, with the exception of industrial switching. The plan is said to eliminate all grade crossings which would be eliminated by the adoption of the plan for a union station on the so-called plaza site in the north end of the city, east of Alameda street and north of Aliso street.

New Elevated Approach to Central State Proposed

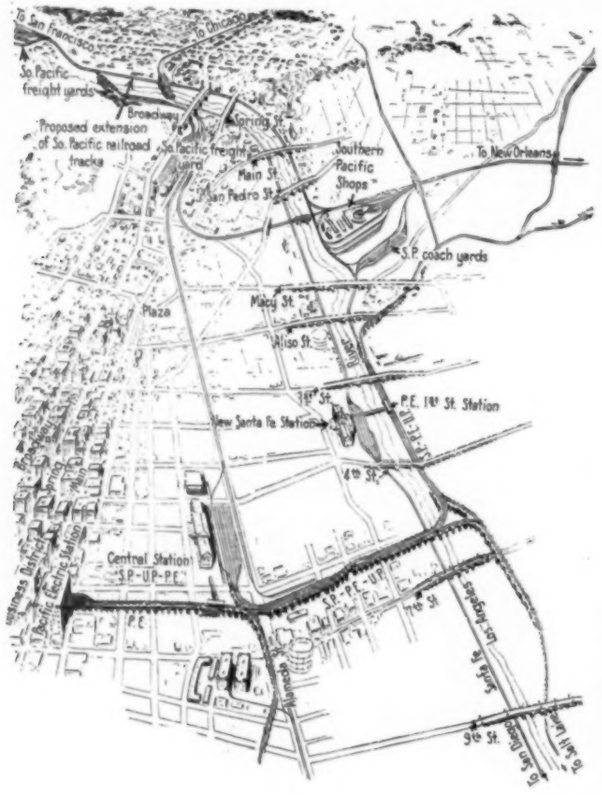
The Southern Pacific owns the site on which its present station is located, the grounds being ample for such extensions of the station as may be necessary to care for the demands for many years to come. The Santa Fe station, located near Third street and Santa Fe avenue is admittedly inadequate and that road for several years has been anxious to replace it with a station commensurate with the needs of the city but has been deterred by the many uncertainties of the union station project.

The extension of the Pacific Electric's elevated track easterly to a point east of the Los Angeles river is in accordance with the recommendation of the Kelker-DeLeuw report on a comprehensive rapid transit plan for the city and county of Los Angeles which was filed recently with the city council and the county board of supervisors. Its adoption will remove from the city streets 1,200 interurban trains with a total of 18,000 grade crossing movements daily and will also provide an entrance to the Central station for Southern Pacific and Union Pacific trains, free from grade crossings. East of the river the Pacific Electric will build a line northerly to a connection to its private right-of-way near Aliso street and will locate a station opposite the Santa Fe station, with a bridge across the river to accommodate passengers transferring between these two roads. Under this plan the Pacific Electric will also elevate its line southward along the east side of Alameda street to a connection with its private right-of-way at Fourteenth street.

In a statement signed by the presidents of the steam roads involved, the prompt prosecution of the work is pledged if the plan is approved and reasons for opposing the union station are presented. Briefly summarized, these state that the present locations serve the public better than would a union station at the Plaza site; that the interchange of passengers between the stations of the steam roads is only 2 per cent of the total number of passengers using the stations; that both the Southern Pacific and the Santa Fe now own commodious station sites and that to discontinue the use of these stations will entail expenditures which will divert money needed for the development of facilities to care for the growing demands of traffic on the Pacific coast; and that the plan proposed will facilitate the interchange of passengers between the steam roads and the interurban lines of the Pacific Electric to a degree that would not be possible at any other station site that has been discussed. In a

separate statement the president of the Pacific Electric states that that road will carry out its part of the work if the plan as proposed by the steam roads is approved.

The agitation for a union station began in 1916, when the Municipal League of Los Angeles filed a complaint with the Railroad Commission of California asking that the railroads be required to eliminate grade crossings within the city and to construct a union station. Early in 1920 the railroad commission issued a report based on a two-year study, recommending the construction of a union passenger station to be located between Commercial street and Alhambra avenue east of Main street, a union freight station, the elimination of grade crossings and other improvements, including the construction of a



new line for the Pacific Electric from its station at Sixth and Main streets to the proposed union station, part of this line to be elevated and the remainder to be in a subway. Later, the commission issued an order requiring the construction of the new station and the elimination of grade crossings. The order was resisted by the railroads on the grounds that the railroad commission had no power to require the construction of a union station and this contention was sustained by a decision of the Supreme Court of California in 1923, and by the Supreme Court of the United States in 1924, both decisions holding that the Interstate Commerce Commission alone had the power to require the building of a union station.

In the meantime an agreement has been reached by the carriers and the city and county of Los Angeles whereby grade crossings were to be eliminated at Macy, Aliso, First, Fourth, Seventh and Ninth streets at the Los Angeles river. Under this agreement the Ninth street viaduct has been completed and that for Macy street is under construction. Plans for the Seventh street viaduct have been completed and the work will be started shortly and the others will follow in due order.

Master Painters Hold Convention at Detroit

THE Equipment Painting Section, Mechanical Division, American Railway Association, met for its fifth annual meeting at the Book-Cadillac Hotel, Detroit, Mich., September 14-16. This meeting marks the fifty-sixth anniversary of the organization of the former Master Car and Locomotive Painters' Association; it was founded in Boston, Mass., in 1870.

At the opening session addresses were made by F. H. Alfred, president, Pere Marquette, and S. P. Seifert, superintendent car department, Norfolk & Western. At this session also an interesting talk was given by Warner Bailey, the oldest member of the Section and the only living charter member of the parent association. Mr. Bailey told of the methods in use many years ago and emphasized the many changes that have taken place in car and locomotive painting in recent years.

Committee reports were presented on Shop Construction and Equipment, Maintenance and Care of Paint and Varnish at Terminals, Tests, Car and Locomotive Painting Standards, New Developments in Equipment Painting and the Ornamentation of Cars and Locomotives.

Mr. Alfred, in his address, drew attention to the importance of developments and progress in the painting field not only from the standpoint of protecting railway equipment from the destructive action of the elements but the possibilities of the use of certain colors which add greatly to the pleasing appearance of railroad property. He pointed out the increasing demand for operating economies and emphasized the opportunity for the painter to be a contributing factor through study and investigation which will lead to the economical use of more durable protective paint materials.

Mr. Seifert, in discussing the work of the Painting Section, mentioned the increasing responsibility of the painter since the advent of the steel car. Protection against deterioration by corrosion, he said, can only be assured by the proper application of high-grade protective materials. He pointed out the increasing tendency to give serious study to the technology of paint and emphasized the value of thorough co-operation between the painter and the chemist in order that new developments in materials and their application may keep pace with the demand for new ways of protecting modern railway equipment.

There was much interest in the report on Shop Construction and Equipment. The increasing use of lacquer has given rise to the absolute necessity of proper ventilation of paint shops, not only as a protection to the health of employees but as insurance against the fire hazard due to the collection of inflammable vapors when using spraying equipment in enclosed shops.

It was also suggested during the discussion that some consideration be given to the advisability of isolating the paint shop from the coach shop in order to protect against the loss of the coach shop in case of fire.

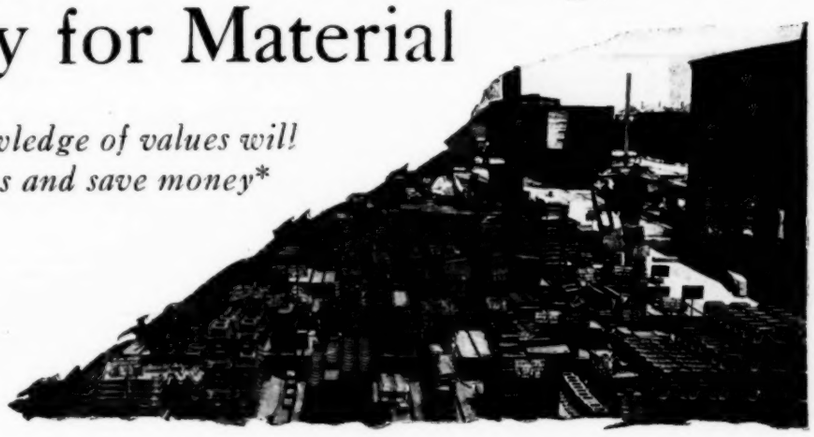
Election of Officers

The following officers were elected for the year 1927: Chairman, James Gratton, general foreman painter, Buffalo, Rochester & Pittsburgh; first vice-chairman, F. E. Long, foreman painter, Chicago, Burlington & Quincy, Aurora, Ill.; second vice-chairman, L. B. Jensen, general foreman, passenger department, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.

It was decided to hold the 1927 annual convention at Louisville, Ky.

The General Foreman's Responsibility for Material

*Fixed programs and knowledge of values will prevent supply shortages and save money**



By D. C. Curtis

Chief Purchasing Officer, Chicago, Milwaukee & St. Paul

THE shortage of material affects not alone the output of the shop, but also the cost of the work. Shortage of material should be avoided even if at some considerable cost.

The surplus of material affects directly only the treasury. However, with railroads having difficulty to earn a fair return on their investment, a surplus of material may involve so much money that retrenchments in both labor and material will be necessary. In the end, the result may be as bad and sometimes worse than a shortage of material.

The amount of material carried in store stock is not necessarily the determining factor in shortages, but the amount of material on hand always determines whether there is a surplus. There are three factors in solving this problem: (1.) Knowledge or understanding of the fundamentals of stock control. (2.) Knowledge of values. (3.) Fixed programs.

Carelessness of Users Defeats Stock Control

In the days when the locomotive and car were comparatively simple pieces of machinery and equipment, when signals were scarcely known, when the shop operation of the railroad could be controlled by one man, shortages, surplus and stock balances were unknown factors. Today, with railroads purchasing a billion and a half dollars' worth of material and supplies per year, with each railroad carrying a minimum of 50,000 different items of material, with the operations spread over thousands of miles of territory, the problem is complex, and a highly organized department is required for the procurement, distribution and care of the material to prevent shortages and surplus, and to maintain a proper balance in the materials account. It requires a trained store department organization, properly maintained stock books, efficient purchasing methods, and the co-operation of the supervisors of all departments.

The stock man that looks after the ordering of the material for a particular shop usually controls as big a business as any merchant in the town. Check his stock balances for the amount of money on the shelves under his control, and his issues in dollars and cents, and compare it with the merchant's stocks and issues. The stock man has thousands of items which he must count once each month to show the quantity on hand, the quantity due, the quantity he is holding orders for. He must obtain information as to probable requirements, not for today, but for 60 to 90 days from today. It requires as long to make a good stockman as it does a foreman in the shop. A stockman must have not only a knowledge of the uses of material, but also a knowledge of all the factors required in procuring the numberless kinds of material. Consider the space required for 50,000 different items. If each item only required a space 24-in. wide, 20 miles of bins would be involved. It would impress many to try walking by all the material carried in a storehouse, and looking at each item.

It is very easy for the foreman to say, "You should have this or that material in store stock today," but it is not easy to state today what is going to be required 60 days hence.

The all-important factor in shortage and surplus is that we do not organize to look sufficiently in the future and so plan the work that deliveries of material can be arranged with sufficient accuracy to carry the plan out. Commercial organizations successfully make a scientific study of what the actual consumer is going to demand, and if we are going to control shortages and surplus, we must avoid the shifting desires and plans which no one can gage accurately or prepare for economically.

Those who would help in solving the material problem must get a knowledge of all the detail which it is necessary for the stockmen to have, of the time it takes them to check their stock, and prepare their orders, the time for the purchasing department to ask for bids, the manufacturer's time to make the goods, and the time for their movement to destination. The manufacturer today depends upon efficient railroad transportation, and, consequently, does not carry any surplus stock on hand, so that he saves the interest, depreciation and other factors which produce debits on his balance sheet.

Users of material should be familiar with the arrangement of stock. If shortages and surplus are to be avoided, it is always desirable to carry material in only one place, so that at all times the stockman, the storekeeper and the user can see the actual conditions.

It is necessary that material should not be drawn from store stock until actually ready for application, so that a correct knowledge may be had of the rate of consumption to enable the stockman to replenish material as needed. Too often, we find material in lockers, on the floor of shops and in out-of-the-way places where it is entirely lost to the storekeeper. This produces abnormal issues, causing both surplus and shortages. For instance, when a man draws for storage in the shop a 60 days' stock of material, the storekeeper immediately re-

* From an address presented before the International Railway General Foreman's Asscciation, Chicago, on September 9.

places the amount drawn, basing his order on the amount of material supposedly used. Then the new lot is surplus and does not move for 120 days. The next basis for ordering is that no material has been used in 120 days. Consequently none is ordered, only to produce a shortage at a later date.

Standards and specifications should be worked out for all the material possible. The fewer the items to maintain, the easier it is to control the stock. Specifications and proper descriptions of material are needed and shop foremen can help very materially to provide them.

Delivery System Advocated

An ordering and delivery system should be put into effect by each foreman, whereby only the actual number of pieces required is delivered, whether it is a washer, one cotter key, a nut, a bolt, or an entire side frame for a locomotive. A delivery system, preferably under the store department, should be in effect in all shops, so that material will be delivered only as needed, and only where it is needed. Such a system allows supervision of the material requirements as they occur. The delivery man is interested in the material required, and also in obtaining it, and any shortages, surplus or abuse are immediately reported. A delivery system is much more economical than the practice of the user obtaining his own material, as it enables the mechanic and workman to apply their entire time to output, and reduces the number of men required for the same shop output. Surprising savings have been made by installing delivery systems, and is well worth considerable time and effort on the part of foremen in shops to see that it is properly organized and carried out efficiently.

Providing that only the exact number of pieces of material are ordered that are going to be required compels proper handling and safeguarding of each piece of material by the workman. Severe discipline should be administered to workmen for drawing any excess of material in advance of the time it is required, and this is one method of preventing both shortages and surplus.

A very simple place for the general foreman to watch, and one which is neglected by practically all, is the scrap pile. The best reclamation known is to use material to destruction at the point of origin. Scrap material should be sorted into the A. R. A. classification of material as it leaves the shop. I have been told that the foreman has not time to supervise the classification of scrap. The foreman and the workmen in the shop, however, are competent to know whether cast iron, cast steel, wrought iron, chrome, vanadium, brass, bronze and the other various kinds of material should be used for each piece of the equipment that they are repairing and handling in their shop. If they know this, they can with very little study and very little effort and very little time direct the classification of the scrap so that it gives them first-hand knowledge of whether material is being used properly, whether it is being used to destruction, whether good material is being wasted through poor workmanship, careless methods or otherwise. Scrap properly classified, moreover, brings at least $2.00 and more per ton when sold, as against unclassified scrap. This is a direct credit to shop operation and reduces operating costs accordingly. Scrap sales on a large railroad amount to $200,000 per month.

Foremen Must Know Values

Too many employees feel that material has no value. A workman will take home a pocket full of nails, maybe a hammer, a saw, or other material belonging to the railroad, with a clear conscience that he is not doing anything wrong, on the theory that material and tools cost nothing; there are plenty more in the storehouse. This loss on the railroads is small, but this state of mind on the part of the employee is costly in operation. If a workman has a piece of pipe to renew, the line of least resistance is to screw out the pipe and throw it in the scrap, together with the fittings, as there are plenty more in the storehouse, and, as far as he is concerned, there is no value to this old piece of pipe or the fittings. If this state of mind, together with its losses, is to be corrected, the workman must be made to realize that he is handling, not pieces of material, but dollars and cents.

A very thorough study of the values of material should be made by each one, and instructions in values given to each subordinate. It is human nature to be careful with money, so every opportunity should be taken to instill into the minds of every user that every piece of material is dollars and cents that must come out of the treasury.

With values comes the knowledge of accounting. Foremen are too prone to conclude that they are not accountants, but mechanics, that accounting in all its ramifications requires too much time to study. However, a working knowledge of the I. C. C. classification, of the fundamentals that enter into shop costs, is easy to acquire, and foremen can be assured that if they master it and supervise the details that govern the making up of the primary reports, the operating statistics can be analyzed and used as a firm basis for a policy of economical control of shop output.

In the purchasing of material the general foreman can also be a great help to his company by being very careful in the information given out to so-called "service engineers," salesmen, etc., who are presenting their material or product to him. It is often embarrassing to the purchasing officer to have a seller come in and inform him that the general foreman has accepted his material, specified it on the requisition and would, therefore, like the order. The purchasing department is always anxious to furnish the kind of material wanted, but it must be left free to enter into negotiations as to price, delivery and payments for the material required.

Fixed Program Saves Money

A fixed program is necessary to prevent shortages and surplus of material. This is not a difficult problem to solve. Commercial firms do it, and there is no reason why a railroad in its programs for its various shops cannot work out a workable program for material. The yearly or annual program or forecast should be carefully worked out for the entire operation of each of your shops, a more detailed program should be worked out for the quarterly activities of your shop, and this broken up into monthly and weekly programs. These programs can be so arranged and planned.

This gives the stockman the necessary information as to the kinds of material, and a close estimate of the quantities required for all the operations in the shop program in sufficient time to order the exact quantity, obtain the most economical prices and arrange for delivery at the time required. It enables the railroad to put into effect a budget program of the amount of money that you will spend for materials and labor ahead of the time it is spent. If you are to save money, you must save it before it is spent. A budget program in dollars and cents for material may sound difficult. However, it is in effect and can be worked successfully with proper co-operation of all concerned. If a million dollars was to be transferred from one bank to another, the responsible parties would see that the operation was consummated so that not even 24 hours' interest on the million dollars would be lost. Yet a railroad will order

material amounting to a million dollars or more that may remain inoperative for days, sometimes weeks, and maybe months. What is lost, not only in interest, but depreciation, obsolescence, taxes, handling charges and housing charges, no one knows.

To prevent shortages and surpluses, and to have a proper stock balance, requires a well organized purchasing and stores department. Many of the railroads, particularly since the days of government control, have realized this. These departments have delivered material so that shortages have been reduced to a minimum. They have prevented surpluses and reduced stock balances, with the consequent savings that have materially helped the other departments make fine showings in operating costs of our railroads.

A few years ago, some of the technical journals published accounts of repairing a locomotive in 24 hours and repairing a freight car complete in less than 8 hours. It was interesting to me to note that in all the pictures and in all the descriptive matter, there was not a bit of evidence shown of how the material was ordered, purchased and distributed in accomplishing the feat described. However, there must have been some one who ordered this material weeks and months ahead of the time required, saw that it was purchased to specifications, delivered where needed and properly accounted for. The point I am making is that users should have a full appreciation of the part material takes in their operations, and the necessity for an efficient materials department. You may think that material ordered and not used is not charged to your operation, but, eventually, every piece of material ordered must be charged to the account for which it was purchased, as the accounting departments, either through direct charges or inventory adjustments, requires that the storekeeper's books balance. If it is purchased and used in an efficient manner, a creditable showing will be made in operations. If it is not purchased, distributed and used in an economical manner, it produces shortages, surplus and large stock balances, with consequent excessive charges in operating expenses of each department.

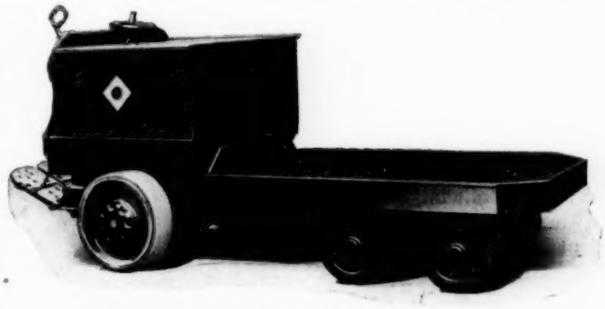
The material problem is one of the most important that the railroads are solving. In order to solve it, it is necessary for all to get a thorough understanding of the factors involved, and then to co-operate to the fullest extent with the stores organization.

The Elwell-Parker Super Lift Tructor

THE super lift tructor, with a load capacity of 20,000 lb., is the latest addition to the mill type series of tructors placed on the market by the Elwell-Parker Company, Cleveland, Ohio, for use around shops, storehouses and other places where heavy materials must be moved. The frame is designed to carry the required loads with a minimum of weight, while the platform is of all-steel construction, heavily reinforced. The lift mechanism, as is characteristic of all Elwell-Parker lift tructors, is located beneath the battery and consists of a special motor direct-connected to a single worm reduction with a nut built into the hub of the worm wheel, a forged multi-thread worm or screw ram traveling in or out of this nut to lift or lower the platform. This lift ram is a one-piece forging designed on the same principle, although for heavier loads, as those used on the first EG lift trucks built in 1916. The platform is supported by two bushed rockers or links on the main sills at the battery end and on a large H-shaped link at the other end, this link being carried on special heat-treated bushings bearing on heat-treated pins provided with pressure lubrication.

The lift motor is equipped with an electro-mechanical brake and the entire lift mechanism may be removed as a unit. The lift controller, which is fitted with interchangeable fingers and reversible finger tips, is located beneath the battery on the left and is operated by a lever which is tripped automatically when the platform reaches the upper or lower limits. The automatic trip connections are also beneath the battery and are accessible from the side of the tructor.

The main drive unit is of rugged construction, with disc wheels running on 7-in. double row, radial and thrust ball bearings, and fitted with 22-in. by 6-in. solid rubber tires. The frame is carried on dual coil springs resting on a three point axle, with self-lubricating axle ways fitted with removable linings. The forward end of the tructor is fitted with two lift pedals with safety tread, on which the operator stands. One of these pedals is



The Elwell Parker Super Lift Tructor

interconnected with the reverse drum so that the drum assumes the off position if the operator steps off, as does the main drum when the controller handle is released. The other pedal applies the brake automatically as soon as the operator's weight is removed from it. The entire power plant is removable as a unit.

The tandem trail axles are of unusual design and carry four wheels, each fitted with two differentiating 15-in. by 8½-in. solid rubber tires, the four wheels steering simultaneously and concentrically with the large drive wheels. Each of these wheels is fitted with two heavy tapered roller bearings carried on independent drop-forged hubs with special heat-treated alloy steel knuckle pins within, the knuckle pins being cupped at the lower end. A steel ball in this cup bears its part of the load when in contact with a hardened steel button resting in a knuckle or yoke pressure lubricating cup, assuring easy steering. Steering levers for trail axles are of vanadium steel, with ball and socket swivels. The steering rods from both axles terminate at the foot of the steering post which is designed with tapered serrations to receive special drop-forged ball levers with tapered serrations to match the lower end of the post. The levers are held in position by locked nuts and the lower end of the steering column turns in a ball bearing. Steering is accomplished by means of a hand wheel, and reduction is through mitre and worm gears supported on radial or thrust bearings, the mechanism operating in a bath of oil. The traveling speed is from 300 to 400 ft. per minute.

The weight of the tructor is approximately 6,100 lb., or less than one-third of its load capacity, and this ratio, combined with its traveling speed, affords operating efficiency in transferring heavy loads. Special accessory equipment is available for handling various commodities.

Changes on Illinois Central and Central of Georgia

C. H. Markham becomes chairman of board and L. A. Downs president of parent road—J. J. Pelley goes to subsidiary

CHARLES H. Markham, president of the Illinois Central, has been elected chairman of the board of directors of this railroad. Lawrence A. Downs, president of the Central of Georgia, the Illinois Central's largest subsidiary, has been elected to succeed Mr. Markham. John J. Pelley, vice-president in charge of operation of the Illinois Central, has been elected to succeed Mr. Downs as president of the Central of Georgia. These changes became effective September 15. The headquarters of Mr. Markham and Mr. Downs will be at Chicago and those of Mr. Pelley at Savannah, Ga.

Charles H. Markham

Few official changes within recent years have aroused as much interest in the railroad world as these. The Illinois Central system has long been recognized as one of the best managed, most progressive and most successful railway systems in the country. Mr. Markham has been known not only as a man of extraordinary physical and mental energy, but has looked younger than his years. His decision to relinquish the arduous duties of a railroad presidency to a younger man was precipitated by a recent severe illness. He is now practically well again, and in his new position will continue to participate actively in the affairs of the railway system, but as he said in a statement issued last week, he took the sickness referred to as a signal that he should relinquish the detail and much of the burden of responsibility he had been carrying for many years.

Mr. Markham's career as a railroad officer has been a very interesting and significant one. He became president of the Illinois Central in January, 1911. On the whole, the property previously had been skillfully developed and well managed. Only a comparatively short time before, however, the preceding president, J. T. Harahan, had exposed a conspiracy of high officers of the company in whom he had reposed confidence, to defraud it of large amounts through the payment of excessive prices for the repair of equipment in outside shops. The earnings of the road had been impaired from this cause, and in addition it had to fight a serious strike in its shops. It won this strike, but this combination of causes had done it much injury. In addition, it had been made unpopular in Chicago by unjust criticisms of it on the ground that it had "stolen the city's front yard" and that the operation of its trains on the lake front was responsible for a large part of the city's smoke nuisance.

Such were the problems which confronted Mr. Markham when he assumed the presidency of the Illinois Central. The magnitude of the work he has done and the responsibilities he has carried during the last fifteen years are indicated perhaps as well as in any way by the increase that has occurred in the railway's investment in property. On June 30, 1911, its investment in road and equipment was $111,540,000, and its total investments, including those in subsidiary lines, were $267,000,000. On December 31, 1925, its investment in road and equipment had increased to $413,248,000, and its total investments to $627,000,000. These increases have taken place partly because of the acquisition of properties not previously owned, but in the main because of expenditures of new capital made to improve and increase the capacity of the properties owned when Mr. Markham became president. The traffic handled has greatly increased, operating efficiency and service have been raised to the best standards of modern railroading, and financial results have improved in proportion.

Mr. Markham has been a firm believer in the future of the Mississippi Valley and has done much to encourage agricultural development in the states served by his line, particularly those south of the Ohio river. By improvement in service, markets have been made accessible for the early vegetable and fruit growers of the south which in turn has made possible the development of thousands of acres, particularly in Louisiana and Mississippi. Passenger service has received equal attention, the Panama Limited being put on as a solid Pullman train late in 1916, the travel on which became so heavy that it was made an excess fare train with a shorter schedule early this year.

Since the passage of the Transportation Act with its

encouragement of consolidations, the Illinois Central has taken over, with the approval of the Interstate Commerce Commission, the Gulf & Ship Island, with 306 miles of lines extending from Jackson, Miss., to Gulfport, and offering a new through route from the central west to the lower gulf coast. It has also taken over the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, which together form an important line from Meridian, Miss., to Shreveport, La., and give the Illinois Central a line of its own to the eastern border of Texas. All of these lines have been merged with the I. C.

There is no class of business executives who have had to struggle within the last twenty years with as many huge and difficult problems as the chief executives of large American railway systems. It is but saying what everybody in the railway world concedes to say that Mr. Markham has demonstrated that he possesses in high degree all the various qualities needed for the successful management of a great railroad under contemporary conditions. He has shown sound judgment and great courage in making huge capital expenditures. He has been remarkably astute in selecting the right men for promotion to high positions and in giving them opportunity and inspiration to do their best. No man has been more skillful in solving problems arising out of the relations between the railways and their employees. In the shop employees' strike which occurred in 1922 the Illinois Central was among the most successful roads in the country in holding a large majority of its employees and in speedily winning the strike.

He has been an outstanding leader in doing and encouraging public relations work. He has believed that the future of the railways depends largely upon creating an intelligent and friendly public sentiment toward them, and that in order to do this it is necessary constantly and courageously to refute misrepresentations of them, and at the same time to make the public understand the dependence of its welfare upon good and adequate transportation and all the things the railways are doing to improve the efficiency of their operation and improve their service. Soon after the railways were returned to private operation he began publishing in all newspapers in the Illinois Central's territory a series of monthly letters over his signature regarding railway matters. He developed ability as a public speaker, and delivered numerous addresses both before national organizations of many kinds and before local business and civic organizations in his own territory. The effects of these and many other things he has done or caused to be done are plainly visible in the territory that his railway serves. He has always taken an active interest in the co-operative endeavors of the railways to improve sentiment among employees and the public. He has been a member of the Western Railways' Committee on Public Relations since it was formed and for two years has served as its chairman.

Mr. Markham was 65 years old last May. He was born at Clarksville, Tenn., and received his education in the public schools of Addeson, N. Y. He was 20 years old when he entered railway service as a track laborer on the Santa Fe at Dodge City, Kan. From May, 1881, to February, 1887, he did different kinds of work in the station service of the Southern Pacific at Deming, N. Mex. He was subsequently agent on this railway at Lordsburg, N. Mex.; Benson, Ariz.; Reno, Nev., and Fresno, Cal. From July, 1897, to September 1, 1901, he was general freight and passenger agent of the Oregon lines of the Southern Pacific at Portland, Ore. He was then made assistant freight traffic manager at San Francisco, and after a few months became vice-president of the Houston & Texas Central, at Houston, Tex. From April 1 to November 1, 1904, he was general manager of the Southern Pacific at San Francisco, and during part of this time was also vice-president.

One of his significant activities when he was vice-president of the Southern Pacific lines in Texas and Louisiana was the waging of a war on the "damage suit industry." There was a strong anti-railway sentiment in the southwest at that time. A certain class of lawyers had taken advantage of this to frame up innumerable cases against the railways for personal injuries, in which

Lawrence A. Downs

John J. Pelley

they were commonly successful in getting juries to grant excessive damages. Mr. Markham decided that the remedy for this situation was an effective publicity campaign, and he vigorously attacked the damage suit industry, both in publicity and newspaper advertisements with very good results.

In 1904 he went into the oil business as general manager of the Guffey Petroleum Company, which position he held six years, and in 1910 he was president of the Gulf Pipe Line Company, the Gulf Refining Company and allied companies at Pittsburgh. During the six years he was in the oil business he acquired experience in the handling of commercial business which later has been helpful to him as a railway manager.

An enumeration of all the projects for improving the Illinois Central and enlarging its capacity that have been carried out during his presidency would be lengthy. The larger projects have included the reconstruction of the passenger and freight facilities at Memphis, Tenn.; the reconstruction and second tracking of that portion of the Kentucky division between Paducah, Ky., and Central City; the rebuilding of the line, including the reduction of grades, the addition of a third track and the installation of modern signaling from the southern limits of the Chicago terminals to Kankakee, Ill.; the separation of grades and the construction of a new station and office building at Champaign, Ill.; marked additions to the mechanical terminal facilities at many points, the largest of which is a $6,000,000 shop improvement project now approaching completion at Paducah, Ky.; and the complete reconstruction and electrification of the passenger and freight terminals now under way in Chicago. Equally liberal expenditures have been made for new and modern locomotives and cars. The expenditures for new equipment in 1924 alone exceeded $26,000,000, including 165 locomotives and 13,000 freight cars. The magnitude of the improvements made is shown by the fact that since 1917 more than $225,000,000 have been spent for additions and betterments, equivalent to approximately $150 a share on the common stock outstanding on December 31, 1925.

Under government control of railroads Mr. Markham was first appointed regional director of the Southern district of the Railroad Administration, with headquarters at Atlanta, Ga. When subsequently the Eastern region was divided he became director of the Allegheny region, with headquarters at Philadelphia.

Lawrence A. Downs

Lawrence A. Downs, who succeeds to the presidency of the Illinois Central, has had practically his entire railway career with this road and its controlled line, the Central of Georgia. He was educated at Purdue University, where his achievements as a football star are still fondly recalled. He has had experience as an engineering, operating and executive officer.

During his presidency of the Central of Georgia he has had both the experience and shown possession of the qualities required for the management of the large parent property. He has carried out an extensive improvement program which has greatly raised the physical standards of the Central of Georgia. Under his administration the traffic has increased rapidly, the revenue ton-miles handled in 1925 being 47 per cent greater than in 1922. The road's operating efficiency has also increased rapidly.

He has devoted much effort and skill to improving the morale of the employees, and it is doubtful if there are any railways in the country on which the relations between management and men are better. He has carried on extensive public relations work with marked success. Under his administration the Central of Georgia has won favor from the people of its territory by its intelligent and effective co-operation with them in opening up and developing natural resources and increasing prosperity. He has regularly issued fair and frank statements to employees and the public regarding what the railway has been doing and is trying to do, which have strengthened their confidence in the property and its management.

Mr. Downs is a fine combination of great physical and mental vitality and a personality that inevitably wins the friendship of those with whom he comes in contact. "Our new president, Mr. Downs, is a man eminently fitted for the job," said Mr. Markham in his announcement of the official changes, and this was a high tribute, coming as it did from one who has shown extraordinary judgment in selecting men for important positions.

After graduating from Purdue University in 1894, Mr. Downs entered the service of the Vandalia Railroad. From March, 1896, to 1898, he was employed in engineering parties of the Illinois Central. From 1898 to March, 1907, he served as roadmaster on the Amboy, Louisville, Louisiana, Springfield and Chicago divisions. Subsequently, to December 6, 1910, he was assistant chief engineer maintenance of way, and then to January 15, 1915, he served as superintendent of the Iowa, Minnesota and Kentucky divisions. He was then promoted to general superintendent of the southern lines; was from August 1, 1916 to January 1, 1919, general superintendent of the northern lines, and from that date to March 1, 1920, assistant general manager. On the return of the railways to private operation he became vice-president and general manager of the Central of Georgia, and succeeded to the presidency on the death of W. A. Winburn in January, 1924.

John J. Pelley

John J. Pelley, vice-president of the Illinois Central, who succeeds Mr. Downs as president of the Central of Georgia, has risen rapidly from general superintendent to his present position within seven years, and is still a young man, being only 48 years old. A strong physical constitution as well as a strong mind are needed by the operating executive of a great railroad under modern conditions, and Mr. Pelley possesses both in a very high degree. He has long been recognized as a "comer" not only because of his ability and inexhaustible energy, but because he possesses the kind of personality that attracts both railway employees and patrons—and experience has shown that personality which begets friendliness is, under contemporary railway conditions, an almost indispensable asset of a successful railway executive.

Mr. Pelley was born at Anna, Ill., on May 1, 1878, and entered the service of the Illinois Central in 1900 as a track apprentice on the Carbondale division. He was promoted to supervisor on the Indiana division in 1904 and in the following year was transferred to the Memphis division. He was roadmaster of the Louisiana and Tennessee divisions from 1908 to 1912. He was then promoted to superintendent of the Tennessee division and three years later was transferred to the Memphis division. He became general superintendent of the southern lines, with headquarters at New Orleans in 1917, and was transferred to the northern lines in 1919.

He withdrew temporarily from the service of the Illinois Central in 1920 to engage in work for the Car Service division of the American Railway Association at Chicago. He was appointed chairman of the Chicago Car Service committee and manager of the Refrigerator Car Section of the Car Service division, in which capacity he served until April 1, 1923. He then returned to the Illinois Central as general manager, and held that position until he became vice-president in charge of operation in November, 1924.

Motor Transport Investigation

Reading and Erie testify at New York—Few oppose bus regulation, few favor it for trucks

THE hearing at Boston was concluded on September 9 and was resumed in New York on September 10. At the New York hearing, only two railroads presented testimony, viz., the Reading and the Erie. There were several street railways which testified and several independent bus operators. By far the majority of appearances, however, were in behalf of truck operators and shippers. Little opposition to regulation of motor buses developed; on the other hand, few witnesses favored any regulation for trucks.

New Haven's Losses Almost $38,000,000 a Year

George M. Wood, freight traffic manager of the New York, New Haven & Hartford, told the commission that while facing intensive competition from the motor truck, his road is also faced by the competition from steamboat lines plying from New York making joint rates with motor trucks to and from interior cities in the territory served by the New Haven rails. The Interstate Commerce Commission has declared interstate transportation partly by motor truck and partly by steamboat as not subject to the Interstate Commerce Act. Tariffs covering these joint rates between steamboat lines and motor trucks are, however, filed with the Shipping Board and may be changed without posting and filing for a period of 30 days as is required by the Interstate Commerce Act. Further, the witness complained, the rates are published as maximum rates, but not necessarily minimum rates.

During the winter season when the railroad territory at times is visited by exceptionally heavy snow storms which leave the highways in bad condition, the trucking company's ability to operate is greatly limited and there is thus thrown upon the railroad in addition to its normal traffic, a heavy tonnage which under normal conditions moves via motor truck, Mr. Wood declared. This comes at a time when the railroad is operating with difficulty, the witness pointed out. Recurring instances of this sort during the winter months require the railroads to have transportation capacity and equipment for traffic which the greater part of the year it does not handle.

The witness declared that the road's answer to the commission's questionnaire states the New Haven system and its affiliated lines are suffering an estimated loss of over $7,000,000 per annum. Appreciating the difficulties in securing information at the time the survey was made, the road now believes it conservative to say that the annual gross freight loss to the system because of operation of the motor trucks is not less than $10,000,000.

Much surprise was expressed at the hearing concerning the New Haven's estimate of losses caused by both the bus and motor truck, the loss in passenger business having been estimated at $27,899,287, or substantially 40.29 per cent of the total passenger revenue, with the yearly freight loss (as stated above) at $10,000,000.

The estimate on passenger revenue loss was calculated on "expectation" of business based upon the normal yearly increase between 1900 and 1905. This was before widespread use of the automobile. The increase in passenger miles in 1905 over 1900 was 24.59 per cent, an average yearly gain of 4.2 per cent. Starting with passenger miles of all classes for 1900, this rate of increase was applied in forecasting future growth. This indicated that passenger miles in 1923 should have been 2,684,377,852.

H. La Rue Brown, spokesman for the Motor Coach & Bus Association of Massachusetts, Inc., took issue with Mr. Wood respecting the joint arrangement between the steamboat and motor truck companies, advancing the statement that none of the shippers or receivers of goods using this service is asking for regulation by the Federal government,—all are thoroughly satisfied. In fact, he contended, the New Haven Railroad had the opportunity of establishing this identical service before the present joint operators initiated it.

It was contention of this witness that no regulation of motor trucks is required, for the interstate business done is practically negligible, he said. The Motor Truck Club offered time tables and other documentary evidence in support of the argument against regulation. The motor coach interests were placed on record as in favor of regulation of the passenger carrying business.

One truck concern, the Winward Transportation Company, was in favor of regulation of trucks. Argument of its representative was that most of the trucks should be regulated because of the unfair competition which is developing. The concern has been forced several times to reduce rates to an unprofitable level to meet competition of some irresponsible driver who does not stay in the field very long. He also advanced the thought that when a trucking concern is backed by the certificate which states that the service it performs is a "public necessity," this gives it a certain prestige and credit with banks so that, if the business warrants, it can borrow funds for expansion.

Rhode Island Commissioner Would Regulate Buses, Not Trucks

Chairman William C. Bliss of the Rhode Island Public Utilities Commission came out flatly for regulation of motor vehicles for the transportation of passengers, but declared the time is not yet ripe for the regulation of the motor truck. Today the character of the motor truck service is such that it might well be considered indispensable to the industries of New England, this authority stated. According to Mr. Bliss, New England would not have been able to carry on its part in the war but for the motor truck.

He severely criticized the "dog-in-the-manger attitude" of the railroads toward the truck operators. The real answer to the problem, he declared, is for the steam roads to wake up and provide terminals for the interchange of freight with the trucks. He cited several instances where motor truck operators would be glad to exchange business with the steam roads, but no facilities are offered. He told Commissioner Esch that the motor truck is here to stay, its logical purpose being to act as a feeder to rail lines. If no demand has been made thus far for regulation of the motor truck engaged in intrastate business, certain it is that no demand exists for regulation of the small amount of interstate business done by the trucks, he contended.

Motor buses, on the other hand, ought to be regulated, according to the Chairman. The public is entitled to good bus transportation and there should be regulation to stabilize the service. According to this witness, the steam roads delayed too long, whether because of finan-

cial reasons or not, in making use of the motor bus as an auxiliary to steam operations. The public demands transportation on rubber, not as a substitute for rail travel, but as an alternative. In his opinion the railroads hereafter should look to development of long haul business and should make arrangements for the interchange of passengers with the buses.

At the hearings in New York, which were held on September 10 and 11, only two railroads, the Reading and the Erie, made a presentation of testimony. The New York Central announced that it was relying upon its answer to the Commission's questionnaire for the presentation of its case, which is apparently the attitude of the other carriers in the territory. Indeed, the testimony of the two railroads which did present a case was confined to a special field, viz., competition from unregulated motor buses, and not to the general subject, including motor truck transportation as well.

Testimony of E. D. Osterhout

E. D. Osterhout, passenger traffic manager of the Reading, testified for his company. He offered as an exhibit an elaborate map prepared by the railroad showing in color its rail lines, those of connecting steam lines, principal highways, existing bus lines, and bus lines proposed by the Reading Transportation Company, application for operating authority for which is pending before the Public Service Commission of Pennsylvania.

Mr. Osterhout stated that his company, as far as passenger service is concerned, is largely a local carrier and therefore has suffered greatly from highway competition. The road's average passenger journey is only 16.71 miles. A large proportion of the total passenger traffic is made up of commutation passengers who ride at rates considerably less than the full fare of 3.6 cents a mile. Highway competition, Mr. Osterhout said, has not taken away from the railroad these reduced-rate riders, but instead has affected the non-rush-hour passengers who pay a higher rate. The result is that the highways are taking the remunerative traffic and leaving the poorer paying business to the rail carrier.

Competitive Bus Line Brings 25 Per Cent Decline

Mr. Osterhout stated that where a check on local passenger service was kept it showed a tendency to decline about 5 per cent a year due to the use of private automobiles. When motor bus service was put on this decline increased to 30 per cent for the first year and continued 5 per cent thereafter, a 25 per cent decline chargeable to buses being deduced therefrom. He dwelt particularly on the motor bus service which is being operated in competition to the railroad between Philadelphia, Pa., and Atlantic City and other Jersey coast points. These buses have multiplied many fold since the opening of the new bridge across the Delaware river at Philadelphia. They charge a round-trip fare which is slightly under the railroad round-trip rate for full-fare passengers. The railroad commuters who pay a low rate and require rapid service for daily travel stay with the trains. Mr. Osterhout advocated the same general type of regulation for interstate buses as that now exercised over intrastate buses. He outlined the railroad's own attitude regarding the use of the bus, saying that it now had applications before the Pennsylvania Public Service Commission for 186 route miles of motor coach routes, the buses to be substituted for unremunerative branch line trains.

The Erie in Northern New Jersey

J. K. Thompson, assistant controller of the Erie, offered testimony, supported by exhibits, showing the effect of motor bus competition on its passenger service in the northern New Jersey-New York suburban zone.

He estimated the road's losses due to bus competition in this area at $1,000,000 a year. Total passenger revenues have shown a decline of $750,553 for the first eight months of 1926 as compared with the first eight months of 1925, from which the loss on an annual basis is computed.

Moreover, the decreases is wholly in those passengers who ride on one-way, round-trip, 10-trip and 50-trip tickets (i.e., passengers paying the higher rates of fare). The sale of the low-rate monthly commutation tickets has increased in the same period that the better-paying traffic has declined.

To make a study of what is taking place in this territory the road selected eight cities, viz., Montclair, Englewood, Paterson, Rutherford, Passaic, Ridgewood and Hackensack, N. J., and Nyack, N. Y. These stations were chosen because of their size and importance and because they serve as termini for interstate bus lines to New York. The sale of 10-trip and 50-trip tickets at these stations for the months of May, June and July in the last three years has been as follows:

1924	$310,245
1925	310,397
1926	256,666
Decrease in 1926, compared with 1925	17.3 per cent

For the same periods sales of similar tickets from New York and Jersey City with these points as destinations were compiled and a decline of 20 per cent was shown in sales in 1926 as compared with the same months in 1925.

For the year ended July 31, 1926, as compared with the year ended July 31, 1925, the change in the volume of ticket sales on the various suburban divisions of the Erie was as follows:

One-way and round-trip tickets	Decrease	$333,000
10-trip and 50-trip tickets	Decrease	189,000
Monthly commutation tickets	Increase	43,454

Electric Lines Testify

The Public Service Railway and Public Service Transportation Company, affiliated companies which respectively provide street car and motor bus transportation in Northern New Jersey, were represented by several witnesses who went into considerable detail to explain their stand on interstate highway passenger transportation.

As evidence of the lack of stability in interstate bus service, it was stated that whereas in the fall of 1925 fifteen companies were operating 49 buses between Paterson, N. J., and New York, only three companies are now operating. The company's witness asserted that interstate bus lines do not give a regular service and cannot be called to account when they fail to do so; they are frequently not responsible financially and are not required to pay the same taxes as the regulated intrastate bus lines.

It was said that there are at present 36 independent bus routes now being operated into New York from New Jersey, with 704 bus trips, handling 7,000 passengers a day. The prospects are, it was testified, that there will be a great increase in this traffic early in 1927 when the new vehicular tunnels under the Hudson river are opened. This prediction was based on the statement that since the opening of the Philadelphia-Camden bridge there has been a tremendous increase in interstate bus operations at that point, there now being 32 bus routes, 2,000 bus trips with 40,000 passengers handled per day in interstate operation over the Camden bridge.

Bus Operators Favor Regulation

C. C. Schaefer, traffic engineer for the Mitten Management, which operates street railway service in Phila-

delphia, Pa., and Buffalo, N. Y., and buses both in city and long distance service, stated that his company, which is a large bus operator, favors regulation of the same character now required for intrastate motor bus carriers. Bus service was started, he said, to protect the company's revenues. He assigned this reason also to the company's bus service between Philadelphia and New York, Philadelphia and Atlantic City, Philadelphia and Washington, Philadelphia and Buffalo, over which routes the company has never had any railway operation. He admitted, under cross-examination, that the Philadelphia-Buffalo line was operated not so much from the standpoint of protecting railway revenues as that of fostering the Sesqui-Centennial Exhibition now being held in Philadelphia.

C. L. S. Tingley, representing interests operating several electric lines in Pennsylvania, Delaware and West Virginia which are using motor buses to extend and improve their trolley service, testified that the interests he represented favor regulation of interstate bus operations the same as that now required of intrastate highway carriers.

A representative of the Newark-Butler (New Jersey) bus line, was presented as a witness by the attorney for the Newark Chamber of Commerce. All the lines of this operator are intrastate in character and subject to regulation by the New Jersey Board of Public Utility Commissioners. The witness testified that he was heartily in favor of regulation because of the protection it offered to the responsible operator from irresponsible competition. He said that he "could not speak too highly of regulation" and believed that he owed to it the continuance of his company in business over a period of five or six years.

Trucks Provide Insurance, Door-to-Door Service and Speed

Representatives of motor truck operators, both contract and common carriers, were present in force and opposed almost unanimously any far-reaching regulation for this type of transportation at the present time. Some operators, particularly the contract carriers, were opposed to any regulation whatsoever. Others—confined almost exclusively to common carriers—where they favored any regulation at all, sought only protection against competition by newcomers in the motor truck field and did not acquiesce in the proposal that the issuance of certificates take into account railroad service.

T. F. Barry, secretary of the Merchant Truckmen's Bureau of New York, who said he represented 498 carriers by motor truck, asserted that the railroads had not at these hearings shown that they were losing business but that on the contrary car loadings figures showed that they were doing better from a traffic standpoint than they had ever done before.

E. A. Hoffman, vice-president of the Motor Haulage Company, Brooklyn, N. Y., stated that his concern was a private contract carrier, doing a general business under contract with industrial concerns, including two railroads, and that he was opposed to regulation for his business.

Motor Operator Believes Railroads Should Operate Highway Service

John R. Bingaman, president of the Bingaman Motor Express Company, Reading, Pa., said that his company operates a haulage service between Reading, New York and Philadelphia, with no intermediate stops. He reported that his company has 14 trucks which at some time during the last six years have served every company in Reading. He testified that the chief commodity carried by his company's trucks is silk, and that the value of the silk hauled is $150,000,000 yearly. He claimed that his company is the only one in Reading which is equipped to take care of transportation to seaboard towns in case of a railroad failure. He gave the route of his trucks as paralleling the Reading and Pennsylvania systems from Reading to Philadelphia, and the Baltimore & Ohio from Philadelphia to New York. To refute the argument that his trucking company might be irresponsible in handling such a valuable commodity as silk, he testified that the trucks were armored and carried a crew of four men, each bonded.

In regard to rates, he testified that the company's rates are generally higher than the railroad's, but in many instances a lesser rate results because of the door-to-door service. He also pointed out that bolts of expensive silk are transported by motor truck without damage, and without being packed.

When asked for his opinion as to the regulation of buses and trucks as common carriers, Mr. Bingaman advocated that bus companies should be operated as subsidiaries of the railroads in order to give the public better and more uniform service and rates, or that trucks should at least be run in conjunction with the railroads. He cited a need for rate laws.

Truck Necessary in Silk Business

J. J. Fennessy, representing the Silk Manufacturers Association of America, testified that a great deal of silk is handled between the mills and distributing points by truck chiefly because the truck is more expeditious; rates are approximately twice as high as the railroads. When a quantity for shipment is large, rail is used, he testified, but for prompt delivery, the motor truck is absolutely indispensable. He also pointed out that silk shipped by rail has to be boxed at additional expense and labor, while the motor trucks give sufficient protection, and can handle the silk without boxing.

In his opinion, any regulation which would impede the flexibility of motor truck operation, or discontinue it, would make necessary a readjustment in the silk business; that the railroads can never give the service given by trucks, because they are restricted to running on rails, and that for the silk business a co-ordinated service would be ideal.

62 Per Cent of Manufacturers Use Trucks

W. F. Bryce, traffic manager of the J. B. Williams Company, of Glastonbury, Conn., appeared for the Manufacturers Association of Connecticut. As a member of the transportation committee of this body, Mr. Bryce testified, he had been intimately connected for the past eight years with bus and truck operation in Connecticut, and with an intensive study of conditions, made in 1925, to present to the Connecticut Assembly in connection with possible state legislation in the matter. He gave figures showing that 62 per cent of the motor trucks used by members of his association are owned by the manufacturers; 63 per cent of the manufacturers operate their trucks supplementary to railroad service; and 33 per cent ship by motor truck entirely. Approximately 73 per cent find motor truck rates cheaper than railroad rates, including collection and delivery. He testified that 76 per cent of the manufacturers were opposed to federal regulation of any sort, and 98.7 per cent were opposed to regulation which would restrict the present flexibility of motor truck transportation. Approximately 91 per cent, he said, believe the New York, New Haven & Hartford could provide store-door delivery service.

W. H. Pease, traffic manager of the Bridgeport Brass Company, Brideport, Conn., testified that his company shipped a heavy tonnage by rail, but that it had found

that in some cases a great amount of business would be lost if motor trucks were not utilized. He quoted figures to show how his company saves money in shipping by truck from Bridgeport, Conn., to Brooklyn, N. Y., because of the elimination of packing the goods. He pointed out that when time was a factor, and shipping by rail to Brooklyn takes from five to seven days, the motor truck is much more expeditious. In addition, he said that the company's trucks can pick up a load of scrap brass in the New York markets on their return trip to Bridgeport, thus saving the company money, since otherwise the scrap brass must be bought from jobbers who make quick pickups of the material in the New York markets, and add their price to the original cost, plus the cost of shipping by rail. In many cases, New York contractors demand special delivery of pipe to buildings under construction, which can only be accomplished through use of the motor truck, Mr. Pease testified.

Another phase of his testimony related to l. c. l. delivered to ship side for export. Shipments are made from Bridgeport in the evening by truck which arrive at ship-side at 8 o'clock the next morning. In this way, dock permits can be secured from steamship companies the night before the shipment is made, whereas if shipped by rail, steamship companies are averse to issuing dock permits, unless the car containing the shipment has actually arrived in Brooklyn. In shipping by truck, often a month is saved. In the case of ports, where ships call only once a month. In this there is a big saving in both cost and time and the use of trucks has eliminated the necessity of maintaining a New York warehouse.

Horner Testifies on Store-Door Delivery

F. C. Horner of the General Motors Corporation gave testimony which follows in part:

Direct collection and delivery, more frequently referred to in this country as "store-door delivery," in England as "c. & d.—collection and delivery." is a problem constantly facing transportation men, merchants and civic authorities.

A system whereby all l.c.l. shipments would be picked up and delivered by the rail carrier, or some agency under its direct supervision, would tremendously decrease the investment in railroad terminals, first, because less space would be required and, second, since that space might be located on cheaper land and at points more convenient and economical for the assembling and dispatching of trains. The merchant, since his transportation service would begin and end at his door, would have little or no interest in the terminal location or facility. Since all competitive lines would be upon an absolutely equal basis, in so far as their contacts with shipper or consignee were concerned, there would be less need for further maintenance of desirable but expensive locations.

For obvious reasons, it is hardly conceivable that such a system can ever be made workable for general carload business. We have developed far too large a class of brokers and middlemen, very likely a necessary link in our distribution scheme, but without facilities for receipt or storage of goods. Many sales are made direct from the cars,—perhaps an economical method in so far as the brokers and public are concerned,—but rendering difficult any organized delivery system. The cars which must be taken into congested areas for convenient inspection, sale and resale, and reconsignment and the shipments billed "order notify" would constitute a serious handicap.

The railroad must bear a part of the cartage cost of any successful system; this cost should not exceed the savings which can be effected in terminal costs.

At some terminal centers it is perhaps reasonable to expect the municipality to bear a part of the cost of an organized collection and delivery service. Public money has been expended in paving and widening streets whose chief use was to accommodate traffic and relieve congestion in the neighborhood of the rail terminals. I see no reason why some of this money should not be expended in securing property or thoroughfares at other points, which, by diverting and re-routing traffic would not only alleviate conditions in the immediate vicinity of the terminals but would result in fewer vehicles on all streets.

The adoption of some plan of complete door-to-door transportation is being forced on the steam railroads of this country. The motor truck offers such a service. I believe its popularity in the short haul transportation field is largely due to this convenience—that and the elasticity of its service. At numerous points the electric line, hard pressed because of the loss of passenger revenue and seeking to replace it with freight revenue, have adopted some form of direct delivery surrounded more or less with certain restrictions. The extension of the direct delivery plan in what we might call the intermediate haul field is proceeding apace. Water carriers and car consolidating companies in the long distance field are making use of direct delivery with its popular appeal. I might say here that these developments bid fair to cause a much greater shrink in railroad revenue and in the most desirable class of rail l.c.l. revenue than all the local short haul trucking services combined. The motor vehicle itself is being rapidly improved, rendered comparatively more efficient over long distances. The tractor-trailer method of operation, with its more intensive use of the expensive power plant, the tractor, is still in its infancy but growing rapidly.

If interstate regulation of the common carrier truck and bus ultimately comes, it would be very unwise to force this transportation tool to use as a basis the complicated unwieldy rail class rate structure.

It is doubly unfortunate that rail expense cannot be reduced in proportion to traffic reduction. The public demands about the same service on the remaining traffic as was granted on all; fixed charges are little affected by decreased revenue and even freight house labor cannot be decreased in proportion to anything like the decrease in tonnage.

It appears to me that at present the question is not the desirability of the adoption by the railroads of some method of direct delivery but rather a study of the conditions, tools and methods by which such system can be put into effect. The retention of present traffic, the regaining of former traffic and the securing of future traffic demand that the most modern tools and practices used by competitive agencies be adopted by the carriers and used to their fullest economic possibility in any manner that appears most expedient provided it is to the best interest of all concerned.

Practical examples of where direct collection and delivery service have been for years in actual operation are England and Canada. Having spent about two years in England and some time in Canada studying these operations, I would like to point out the following advantages of such a service. Taking London as typical of large terminal operation we find that:

All but 10 per cent of their miscellaneous goods traffic is delivered to store door the same day it arrives at the terminal.

The railway companies' cartage vehicles collect and deliver 80 per cent of the miscellaneous goods traffic passing through their terminals and the bulk of the inbound traffic is delivered at store door by 12 o'clock daily.

It is common practice to give 24 hour service on this class of traffic up to 200 miles distant.

The English railway cartage vehicles average 60 per cent load efficiency in spite of the fact that "returned empties" are included in the tonnage moved per van per day. If empties

were left out, the load efficiency figure obtained would probably average between 70 and 75 per cent.

[Mr. Horner here compared American, British and Canadian practice and presented the findings of the Atlantic States Shippers' Advisory Board with respect to store-door delivery.]

Finally I would point out that in any form of store-door delivery the motor truck is bound to play a vitally important part, therefore, it will be necessary to insure that its usefulness not be restricted by unwise regulation, federal, state or municipal, either as to physical or service characteristics. The tractor-semi trailer, the motor truck and the container interchanged between rail and road vehicles hold out great possibilities to increase the efficiency and economy of freight transportation service in our terminals. Let us make sure that nothing is done to prevent our capitalizing to the fullest their usefulness.

Views of New York Merchants' Association

W. H. Chandler, chairman of the legislative committee and manager of the traffic bureau of the Merchants' Association of New York, called most of the witnesses from the motor truck operators. He went on record for his association as being opposed to any regulation of the motor truck which would likely restrict its usefulness to shippers. He sketched the situation with regard to the eastern roads and store door delivery, stating that it was the shippers' desire that in performing store delivery service the railroad be responsible for the shipment to the consignee's door and that shippers were opposed to store door delivery which would not provide this protection for them and which would result in lessened terminal difficulties for the railroad with no additional advantage to the shipper. He presented a report which was presented to the Merchants' Association by its transportation committee and approved by the executive committee which read in part as follows:

> Your committee on transportation is of the opinion that some form of motor truck regulation is necessary but it is not prepared to recommend that the regulation of motor trucks should necessarily follow along the lines that now govern common carriers by rail, and bearing in mind that the same kind of agitation respecting the regulation of railroads was indulged in prior to the enactment of the Interstate Commerce Act in 1887, your committee recommends that the association take the position that no legislation governing the operation of motor trucks as common carriers in interstate commerce be enacted until Congress has made a very thorough investigation of motor truck service, the rates charged, the protection given to the shipping public, and other factors which should be studied in order that the legislation may be constructive, fitting the needs of the situation, and not having a tendency to impose undue burdens upon this comparatively new form of transportation service.

Mr. Chandler stated that he did not believe that motor trucks would be placed under regulation unless they too were granted the same protection for their revenues as that accorded to the railroads under section 15a of the transportation act. He stated that motor trucks had come into use because: 1. Railroads had desired to get rid of short haul l.c.l. traffic; 2. because railroad service was much slower for short distances than the truck; 3. because at the time truck transportation had its inception there were frequent railroad embargoes; 4. because railroad rates for this traffic with the addition of cartage charges at each end of the haul were frequently very high. He made it clear that none of the objections which he stated to regulation applied to motor buses.

The Port of New York Authority was represented by a witness who gave a general picture of the Port Authority's plans for the port district, which include a number of off line freight stations in New York to be served from New Jersey rail terminals by motor truck. The witness stated that the Port Authority desires direct all-rail service to all parts of the port district where possible; were not, the best other service available. He stated that, whereas most of the railroads terminate on the New Jersey side of the Hudson river, 76 per cent of the population and 85 per cent of the industries are located on the New York side. An elaborate exhibit was presented which showed the trucking operations of all the railroads in the district which use trucks for moving freight, with comparisons on the amount of freight actually moved by truck and the amounts which could be so moved. Only two per cent of the freight in the district which could be trucked is trucked the witness declared.

The Newark Chamber of Commerce was represented by a number of witnesses, who presented figures to show that the tonnage originating in Newark for distances under 20 miles was moving by truck and for distances greater than 20 miles by rail. He was opposed to any regulation of the motor truck which would tend to throttle its activity as a short haul door to door carrier.

It was testified that 15 interstate bus lines are now operating through Newark and that a considerable street congestion may develop if they continue to increase in number. This possibility was viewed with some concern, since there has been a great growth in the use of the intrastate bus in New Jersey, which may be expected with the interstate bus.

It was brought out that railroads in New Jersey are taxed at a higher rate than that prevalent in most other states of the Union and, moreover, that New Jersey is one of the few states where railroads are required to pay all of the expense of grade crossing elimination—a demand for which, of course, increases greatly with heavier highway traffic. The witness testified that bus transportation had flourished in New Jersey under state regulation and that interstate operation would not be injured by being subject to the same type of regulation. It was also brought out that most of the interstate bus lines which operate in New Jersey operate over a considerably greater mileage in New Jersey than they do in adjoining states—i.e., Atlantic City-Philadelphia and New York-Philadelphia buses, while they enter New York and Philadelphia, do almost all their real traveling on New Jersey highways.

The hearing closed with the testimony of John J. Fitzgerald, secretary of the Paterson, N. J., Chamber of Commerce, who stated that this body was in favor of the regulation of motor bus lines which parallel railroad lines, but is not in favor of the regulation of motor trucks. He also testified that approximately 75 per cent of the silk manufactured in the United States comes to Paterson either for manufacture or dyeing, and that motor trucks are indispensable in the handling of both the raw material and finished product.

The hearing in New York was ended on September 11 and resumed in Asheville, N. C., on September 15.

The Hearing at Asheville

Testimony from regulatory bodies on bus transportation from practically all of the South Atlantic states formed the chief work of the first days' hearing at Asheville, on September 15. The morning was occupied by testimony from five representatives of the American Short Line Railroad Association. Bus operations are making inroads on the business of railroads in southern territory, particularly in the passenger service, it was brought out at the hearing.

S. A. Markell, representing the bus division of the American Automobile Association occupied a large part of the afternoon with various witnesses whom he presented to support his contention which is that of the North and South Carolina and Virginia commissions that bus transportation is essentially a local problem and that all interstate bus operation should be regulated by the state commissions.

Freight Car Loading Again Breaks Record

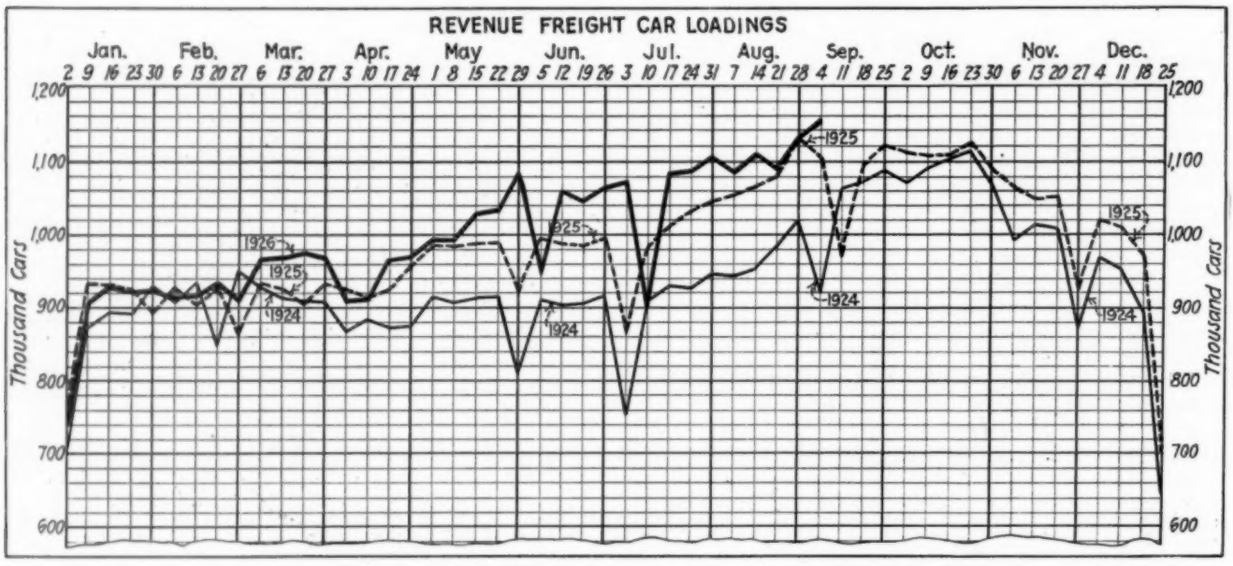
WASHINGTON, D. C.

ANOTHER new record for the number of cars loaded with revenue freight was established in the week ended September 4 when the total was 1,151,346 cars, exceeding the previous record, set in the last week of August, by 15,113 cars. This compares with the following peak figures for recent years: 1922—999,718 cars; 1923—1,097,493 cars; 1924—1,113,053 cars; and 1925—1,124,438 cars. In 1922 and 1924 the peak loading of the year was in October, in 1923 it was in September, and last year it was the last week in August.

This was the fifteenth million-car week this year and brought the cumulative total for the year up to 35,850,857 cars, an increase of 1,153,064 cars as compared with the corresponding period of last year and of 3,375,496 cars as compared with 1924. The loading for the week showed an increase of 48,561 cars as compared with the corresponding week of last year and of 230,043 cars as compared with 1924, but the corresponding week in that year included the Labor day holiday.

The Southern and Southwestern districts showed decreases in loading as compared with last year but otherwise increases were reported in all districts as compared with both preceding years. Increases as compared with the corresponding weeks of both years were also reported in all commodity classifications except grain and grain products, which showed a decrease of 7,635 cars as compared with 1924. The largest increases over last year's loading were shown in coal and ore, while miscellaneous freight, with a total of 431,566 cars, showed an increase of 8,378 cars.

The summary, as compiled by the Car Service Division of the American Railway Association, appears at the bottom of the preceding column.



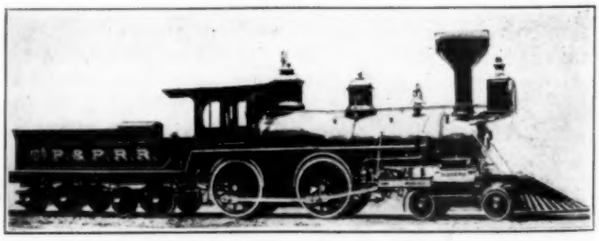
REVENUE FREIGHT CAR LOADING—WEEK ENDED SATURDAY, SEPTEMBER 4, 1926

Districts	1926	1925	1924
Eastern	272,152	247,585	202,814
Allegheny	232,570	214,643	180,327
Pocahontas	60,044	57,533	43,345
Southern	155,870	159,686	131,716
Northwestern	179,039	176,604	143,215
Central Western	168,103	161,106	153,736
Southwestern	83,568	85,628	66,150
Total Western districts	430,710	423,338	363,101
Total all roads	1,151,346	1,102,785	921,303
Commodities			
Grain and grain products	57,361	56,108	64,996
Live stock	33,210	32,208	32,706
Coal	197,877	178,421	149,945
Coke	12,300	11,268	7,268
Forest products	71,645	71,528	62,875
Ore	74,770	59,461	45,949
Mdse. L.C.L.	272,617	270,603	218,689
Miscellaneous	431,566	423,188	338,875
September 4	1,151,346	1,102,785	921,303
August 28	1,136,233	1,124,438	1,020,809
August 21	1,088,791	1,079,995	982,760
August 14	1,109,557	1,064,476	953,408
August 7	1,083,199	1,052,518	941,407
Cumulative total, 36 weeks	35,850,857	34,597,793	32,475,361

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended September 4 increased 5,168 cars over the previous week, grain showing a seasonal increase of 3,909 cars. Compared with the same week last year there was an increase of 3,159 cars.

	Total for Canada			Cumulative Totals to Date	
	Sept. 4	Aug. 28	Sept. 5		
Commodities	1926	1926	1925	1926	1925
Grain and grain products	8,702	4,793	11,861	224,408	198,611
Live stock	2,376	2,404	2,561	70,886	78,152
Coal	7,007	6,958	5,179	184,996	115,705
Coke	230	352	269	12,664	9,539
Lumber	3,793	3,846	4,009	128,028	125,498
Pulpwood	1,894	2,229	1,923	100,222	97,063
Pulp and paper	2,138	1,973	2,035	85,119	71,339
Other forest products	2,757	2,559	2,349	110,163	100,188
Ore	2,085	2,116	1,423	58,700	47,538
Merchandise, L. C. L.	18,246	17,905	16,994	566,031	532,066
Miscellaneous	16,907	15,832	15,922	485,698	427,657
Total cars loaded	66,135	60,967	64,525	2,026,915	1,803,356
Total cars rec'd from connections	38,876	38,771	36,516	1,299,870	1,162,774



Built by Rogers for the St. Paul & Pacific (Now G. N.)

Second Pere Marquette Train Control Installation Approved

WASHINGTON, D. C.

DIVISION 1 of the Interstate Commerce Commission has issued an order approving, with exceptions, the installation of the automatic train-stop system of the General Railway Signal Company on the Detroit division of the Pere Marquette from Lansing to Oak Station, Mich., 78.6 miles, of which 15.6 miles are double track, made pursuant to the commission's second train-control order, dated January 14, 1922. This portion of the Detroit division is continuous with that which is equipped with the same type of device under the first order, of June 13, 1922, which was recently approved. There are a total of 67 locomotives equipped under both orders, which operate on or over both portions. The exceptions are the same as those of the report on the first installation, which was abstracted in the *Railway Age* of September 11, page 459.

The cost of this installation as reported by the carrier, covering wayside equipment and locomotives, is as follows:

1. Total cost of roadway equipment of train control installation, less power lines and power apparatus, if any, and less cost of signals or cost of change in existing signal system; less salvage	$40,700.27
2. Total cost of power lines and power apparatus, if any, less salvage	None
3. Total cost of signal system installed in connection with train control; less salvage	None
4. Total cost of change in existing signal system made necessary by train control; less salvage	5,490.07
Total cost of roadway installation	$46,190.34
Total cost locomotive equipment installed	44,920.37
Total cost of installation	$91,110.71

The total cost of roadway installation shown above, includes the cost of equipping four miles of track between Pennsylvania Junction, Mich., and Oak Station, Mich., which, upon petition, the commission has authorized the Pere Marquette to discontinue and remove.

The New Railway Labor Act*

By Samuel E. Winslow

Chairman United States Board of Mediation, September 16, 1926.

THE Watson-Parker bill, designated to be cited as the "Railway Labor Act" was passed by Congress at its last session, signed by the President, and so became a law in effect May 20, 1926. By its passage the Newlands act and other existing federal laws which might be found in conflict were repealed.

The only definite board established by this law is the Board of Mediation—with headquarters in Washington, D. C.—made up of five members appointed for terms of five, four, three, two and one years with a provision that future appointments should be made one each year for a term of five years.

The work of the Board of Mediation comprehends in a general way the establishment and operation of the machinery necessary for the execution of its own prescribed duties and also, by inference, a general helpfulness to other agencies which may function under the law.

The Railway Labor Act was prepared by representatives of a large majority of railway companies and their employees engaged in interstate commerce, including employees of express companies, sleeping car companies and any carrier by railway subject to the interstate commerce act, including all floating equipment such as boats, barges, tugs, bridges and ferries and other transportation facilities used by or operated in connection with any such carrier, etc., by railway and any receiver or other individual or body when in possession of the business of such transportation companies. The act, however, does not include carriers engaged in strictly interurban business.

Employers and employees favoring and responsible for the creation of the bill represented to Congress and otherwise that they were in harmonious accord with its provisions and they stated frankly and emphatically that they desired the proposed legislation passed. Congress was evidently impressed with their sincerity and passed the bill with little or no modification.

Members of the Board of Mediation were duly nominated by the president, confirmed by the Senate, and early in July assumed their duties.

The Board of Mediation is given authority to maintain headquarters in Washington, D. C., and, generally speaking, initiate and supervise the work incident to a proper execution of the law. Obviously at this time a discussion of technical features of the act would be too long drawn out and a statement in respect of the workings of the board or its interpretation of specific features of the act would be out of place and probably improper.

It should be carefully noted that the Board of Mediation amounts to an agency provided for by Congress and appointed by the President at the earnest request of both carriers and their employees. It is but fair that the country expect willing, generous and full co-operation of both with the Board of Mediation and also in respect of the law as a whole.

The fundamental purpose of the Watson-Parker bill was to provide a law for the settlement of railway labor disputes without strikes. For many years the subject of mediation of such matters has engaged the attention of the country. In 1898 the Erdman act was passed in the hope of adjusting railway labor discussions through mediation and previous to that time and for many years proper legislation for such accomplishment was discussed. Later on, in 1912, the Newlands act was passed and in 1920 the transportation act became a law and the railway labor board was set up.

No compulsory Federal labor laws have ever been enacted and Congress has consistently refused to pass any law with "teeth" in it and probably for the reason that not only has public opinion, for the most part, been opposed to such an idea but also because no plan has ever been suggested which appeared to be workable. The aim has always been, as apparently emphasized in the present act, to bring about a desire and method for having adjustments made by the parties to disputes voluntarily, if possible, without outside assistance or pressure, or through some government agency whose findings would be accepted as fair all around.

It is to be hoped that the execution of the methods provided in the present law, or as it may be hereafter developed, may point the best way to settle all industrial disputes whether in the field of transportation or in other commercial lines. Any technicalities or unsatisfactory provisions which may appear in the Railway Labor Act ought to be duly and in an orderly manner worked out satisfactorily.

If the best is to be accomplished each party must give and take in the interest of all, including of course, the public, and the law should be developed and operated so as to meet changing economic conditions.

While previous legislation has failed to accomplish all

*From an address at Babson's Thirteenth Annual National Business Conference, Wellesley Hills, Mass., on September 16, 1926.

that has been desired a forward movement has constantly been apparent. At all times sober thought has been the same in respect of the underlying principles of mediation and arbitration although the laws and methods employed have been different.

The Watson-Parker bill was drawn and passed as a result of an earnest desire on the part of railways and their employees to profit by the experiences growing out of past unsatisfactory laws and for the purpose of creating a plan for the adjustment of differences in an intellectual way as contrasted with more volcanic and violent proceedings which have too frequently marked railway labor discussions hitherto.

It would not be surprising if, in the not too distant future, a new and more equitable plan of determining and fixing wages, etc., should come into being.

The government, by way of Congress, is but the agent of the people and must go to the greatest possible extent, wisely and firmly, to safeguard public interests which means the well being of the greatest number. Even so, the fewer laws the better.

The Railway Labor Act will accomplish its most useful purpose in proportion to the minimum number of direct services rendered by the Board of Mediation and other boards created under the law. The more the voluntary settlements made by carriers and employees without recourse to other agencies, the better.

The Board of Mediation can render no better service than by contributing to the development of an all around good will between the employees and their employers.

The proponents of the bill before its passage and since have insistently represented that they wish to live and serve under peaceful labor conditions established through peaceful negotiations. Congress and the public are more than willing to take them at their word and will gladly and helpfully give their approval and wishes for a successful operation of the law.

The obligation of railways and employees to the country is not only moral but economic and human as well and as they recognize and meet these responsibilities so will the law become workable and effective. "More strength to their arm!"

Neither employees nor employers can properly claim exclusive credit for the Watson-Parker bill. To each group is due equal praise for its participation and its avowed good intentions and to each the same commendation should be given for constructive accomplishment thus far. Censure and its attending consequences must inevitably and properly fall on those who fail to support generally the letter of the law and particularly the spirit of it.

The Board of Mediation has been functioning about two months. The work of organizing and setting up the physical features of headquarters occupied about one-half the time. In spite of this fact the consideration of cases has been under way and conferences have been held at which members of the board have been in attendance. These have been at various points from the Atlantic to the Pacific.

Of necessity the work of mediators must be highly confidential and all those who have to deal with them must come to respect and trust the Board of Mediation and extend to it and its representatives all possible information. A breach of complete confidence on the part of the mediators would be fatal.

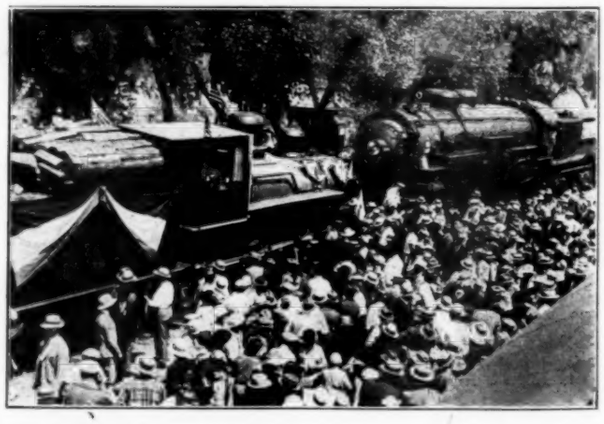
While there is every reason to believe that employees and employers appearing before the Board of Mediation will generously support this mediation work it can be happily said, without any breach of confidence, that thus far the negotiations entered into under the Railway Labor Act have been of high order. There have been no recriminations, no unfriendly references, nor any manifestations of hostility on the part of those representing the various interests.

No one, probably, would care to guarantee a complete and satisfactory solution of every case which may be considered; nevertheless if good will, as thus far manifested, and a desire to make the law a success prevail, there is reason to expect good results and at all events more satisfactory conclusions than those which have ordinarily been reached in the past.

In thinking of this law and in working out its provisions the public and all interested persons and organizations may well agree that we should look forward and not back. It is not to be expected that the law as it stands today is perfect. By its omissions and commissions weak spots are likely to be discovered. If employers or employees are of a mind to seek advantages through technicalities which the shortcomings of the law may afford it will be possible but exceedingly unfortunate. If, on the contrary, the parties in interest are serious and earnest in a desire to develop and establish the principles set out in the law through co-operation as to its spirit rather than, maybe as to its letter, there would appear to be no reason why in an orderly manner from time to time the law should not be improved and ultimately not only become easily workable but, of more importance, establish a good fellowship and an intellectual method of discussing and solving problems.

The Board of Mediation interprets the action of Congress in passing the Watson-Parker bill as an expression of genuine desire on its part to have the present existing legislation taken up on new lines as contrasted with previous efforts on the part of the government, and so help bring about prompt and fair adjustments of railway labor disputes.

THE LAW OF NEW YORK (known as the Kaufman Act) under which all railroads operating within the limits of New York City are required to discontinue the use of steam locomotives, has been declared unconstitutional in a decision handed down last week by Federal Judges Learned Hand, John C. Knox, and Thomas D. Thacher. The larger roads had already secured an injunction deferring the enforcement of the law. The court holds that the law would be a regulation of interstate commerce, interfering with the proper exercise of such regulation by the federal government. The regulation of locomotives is a field in which Congress has already acted—in the boiler inspection act and in parts of the safety appliance acts.



Wide World Photo

Celebrating Fifty Years of Railroad Service in Los Angeles

General News Department

The championship baseball teams of the Pennsylvania and New York Central will meet at Indianapolis, Ind., on Saturday, October 2, to settle the 1926 baseball championship honors between the two lines. The game will be played on the American Association diamond.

The Chicago & Alton on September 14, following a hearing before the railroad mediation board, granted telegraphers, stationmen and towermen an increase of 1.8 cents an hour in their wages, with adjustments of rules. The employees had asked for an increase of five cents an hour.

The city of Cincinnati and the Cincinnati Chamber of Commerce and Merchants' Exchange have petitioned the Interstate Commerce Commission to change the boundary line between the standard Eastern and Central time zones in order to place Cincinnati within the Eastern zone.

The Louisiana Sunshine Special of the Missouri Pacific, northbound train No. 102, was derailed by malicious tampering with the track near McGehee, Ark., shortly after midnight of Monday, September 13, the locomotive being overturned and the engineman killed. The fireman and 19 passengers were injured. Unknown parties had removed angle bars and spikes from track.

Three bandits who robbed three jewelry salesmen on the New Orleans Limited of the Illinois Central of $500,000 worth of gems on September 8, as the train was approaching Champaign, Ill., were captured before noon on the following day in a barn near Buckley, Ill. The bandits, who evidently boarded the train at Chicago, entered a compartment as the train was nearing Champaign, bound and gagged the salesmen, took their jewelry and rode to Champaign, where they alighted, hired an automobile and disappeared.

The Nashville, Chattanooga & St. Louis following conferences by the officers with representatives of train service and engine service employees has agreed to submit to arbitration the request of these employees that foreign roads be not allowed to run trains over the N., C. & St. L. G. W. W. Hanger, member of the U. S. Board of Mediation, was present at the conferences. The company has made a contract allowing the Gulf, Mobile & Northern to run freight trains over the N., C. & St. L. between Jackson, Tenn., and Paducah, Ky.

Train Robbery at 94th Street, Chicago

Over $132,000 in currency, destined for a Harvey (Ill.) bank, was taken from a mail car on an eastbound Grand Trunk train at 94th street, Chicago, on September 10. Two bandits entered the car near the outskirts of the city, bound and gagged the two clerks, and threw the money off the train at a point where another companion was waiting in an automobile. As the train slowed down at Evergreen Park station, the bandits jumped off and disappeared in another automobile. The money stolen, which had been mailed at Chicago, was for the payrolls of three manufacturers in Harvey.

Pennsylvania System Meet to Be Held at Philadelphia, September 18

The sixth annual system athletic meet of the Pennsylvania will be held in the Sesqui-Centennial Exposition stadium in Philadelphia, September 18. Approximately 1,085 athletes, representing the various regions of the railroad, will compete for championship trophies in several lines of sport. This is the first time in the history of the Pennsylvania athletic competition that a meet has been held in Philadelphia, the headquarters of the railroad. The eastern region will act as host to the athletes and visitors from the other regions. It is estimated that between 30,000 and 40,000 officers, employees and guests will be present to witness the championship competition. General arrangements are in the hands of C. S. Krick, vice-president of the eastern region, who will be assisted by J. O. Hackenberg, general superintendent of the Philadelphia terminal division.

Heavy Rainfall in Central Illinois

Considerable damage occurred to railroad property when from five to six inches of rain fell in central Illinois on September 8 and 9. Service on lines into Springfield, Ill., was tied up on September 9 for periods ranging from six to 48 hours. On the Baltimore & Ohio line between Springfield and Beardstown, one-half mile of track was washed out and at several other points the water was two feet deep over the tracks. Service between Springfield and Beardstown was discontinued from 8 p. m. on September 8 until the evening of September 9. The Wabash was forced to discontinue operation between Moberly, Mo., and Decatur, Ill., on September 8, when 16 bridges were endangered and the track was washed out between Hannibal, Mo., and Springfield, Ill., for 2½ miles. At Jacksonville, Ill., the failure of a dam released the waters of a lake three miles long and three-quarters of a mile wide, which washed out a bridge and 400 ft. of track of the Jacksonville & Havana.

On Tuesday, the 14th, the line of the Chicago, Burlington & Quincy, north of St. Joseph, Mo., was flooded in a number of places and a southbound passenger train was delayed four hours. Another passenger train was marooned on the line from Amazonia, Mo., to Creston, Iowa.

Fire Prevention Week

The week beginning Sunday, October 3, has been designated as annual fire prevention week in the United States. The Railroad Insurance Association, 80 Maiden Lane, New York City, in an appeal which it circulates among the railroads, lays stress on the importance of taking careful note of past performances; and, continuing, says—

"Have you missed all these bright events in recent years?

7975	Railroad	fires	in 1920
7963	Railroad	fires	in 1921
9216	Railroad	fires	in 1922
8395	Railroad	fires	in 1923
8609	Railroad	fires	in 1924

The Nation's fire waste in 1925—$570,255,921.

"Don't get discouraged! Just remain careless and indifferent, with the feeling that the other fellow is responsible and will do it, and some day—all of a sudden—there will be a bad fire right where you are working. . . . Here is the chief value of Fire Prevention Week to you; it should help you to recognize the fire dangers that are near you; to substitute action for waiting. . . ."

Union Pacific Athletic Meet

The annual athletic meet of the Union Pacific system was held at Cheyenne, Wyo., on September 6, 7 and 8. It was opened with a historical pageant which set forth the history of transportation and the development of the railroad from 1861 to the present time. The march was led by Carl R. Gray, president, who rode in an old-fashioned victoria drawn by four horses.

The three-day contest of employees included the shot put, the 120-yard high hurdle, the 880-yard run, the 100-yard dash, the pole vault, the 400-yard relay, the 220-yard low hurdle, the Medley relay, the two-mile run, the 880-yard relay, the discus and javelin throw, the running broad jump, the standing broad jump, horseshoe pitching, trapshooting, golf, tennis and baseball. The 400 entries represented the four roads comprising the system

and prizes were awarded individuals and groups. The Union Pacific representatives won the meet by receiving 155½ points, the Los Angeles & Salt Lake teams were second with an aggregate of 113 points, the Oregon-Washington Railroad & Navigation contingents were third with 104½ points, and the Oregon Short Line teams were fourth with 100 points.

Inquest Held on Chicago & North Western Wreck

At a coroner's inquest into the collision of two passenger trains of the Chicago & North Western at Clybourn Station, Chicago, on September 6, in which five persons were killed and 50 were injured, as described in the *Railway Age* of September 11. Engineman Smith testified that he had been treated during the last year for an ingrown goitre and for heart trouble which had caused him to be off duty 15 days each month. He claimed that he was going only about 15 miles an hour when he sighted the caution signal. When the headlight of a northbound train blinded him he slowed down to four miles an hour. The testimony of the engineman was contradicted by the towerman at the Wood street interlocking plant, who said that at the time of impact the train was moving at 15 miles an hour and that he had leaned from the tower window and shouted to the engineman. He also said that while both trains were late, the second was running only three minutes behind the first.

The railroad's physician testified that the engineman had had four physical examinations in the 17 years he had been employed by the company, the last one being in May, 1926, following an injury to his hand. The physician said the engineman's sight, hearing and mentality were normal and that the railroad had never learned that the engineman was suffering from an internal goitre.

The fireman of train No. 734 said that the brakes were set by Engineman Smith. At earlier stops on this run the engineman had overrun stations but the fireman could not say whether this was because of bad brakes or of negligence. The conductor and a brakeman both said that they did not notice the setting of the brakes.

The Colorado Wreck

The total number of fatalities resulting from the derailment of eastbound passenger train No. 2, of the Denver & Rio Grande Western, near Waco, Colo., on September 5, reported in the *Railway Age* of September 11, is now reported as 30, the bodies of two additional passengers having been recovered from the wreckage in the river.

An officer of the road stated that undoubtedly the causet of the derailment was excessive speed. The train was 25 minutes late and the evidence indicates that it must have been running at 40 or 45 miles an hour. The curvature of the line was 11 degrees, 40 minutes, and the grade, descending, 1.42 per cent. The train had 15 cars, of which ten remained upright on the road bed. The derailed cars were all of steel except one Pullman, which had steel underframes.

Canadian Trainmen Seek Increase

Substantial increases in pay similar to those sought in the United States are asked by conductors, baggagemen and brakemen on the two main Canadian railways. The case is being dealt with by a board of conciliation sitting in Montreal and consisting of Judge H. T. Kelly of Toronto, chairman; Isaac Pitblado, Winnipeg, representing the railway companies; and David Campbell, Winnipeg, representing the men.

Conductors in passenger service who now receive $6.40 per day, or $192 a month, are asking for $7.75 a day, or $232.50 a month. Baggagemen in passenger service who now receive $4.56 a day, or $136 a month, are asking for $6.16 a day or $184.50 a month. Brakemen and flagmen in passenger service who now receive $4.40 a day are asking for an increase to $6 a day.

Conductors in local freight service who now receive $6.32 a day are asking for $7.74 a day. Brakemen in local freight service who now receive $4.88 a day are asking for $6.24 a day. Conductors in through freight service who now receive $5.80 a day are asking for $7.34 a day. Flagmen and brakemen in through freight service who now receive $4.48 a day are asking for $5.84 a day.

Yard service foremen who now receive $6.32 a day are asking for $7.64 a day. Yard service helpers who now receive $5.84 a day are asking for $7.16 a day. Yard service switch tenders who now receive $4.40 a day are asking for $5.72 a day.

Musical Locomotive Whistles on the St. Paul

The Chicago, Milwaukee & St. Paul has had in service for some time on the locomotives of the Southwest Limited, between Chicago and Kansas City, a chime whistle which has proved so satisfactory that it is planned to introduce it for general use. A circular issued by H. E. Byram, receiver, telling of the action of the company in this matter, starts off with verse:

> Casey pulled up that Reno hill
> and tooted for the crossing with an awful shrill.

Continuing, the circular says:

"The immortal Casey Jones, according to the famous song of a decade ago, has 'gone to the Promised Land with his orders in his hand.' But the sudden and lamented departure of that brave engineer did nothing to abate a nuisance that has set millions of teeth on edge and caused the cold shivers to ripple up and down countless spinal columns. Thousands of Casey Jones' compatriots have carried on where he left off and have been 'tooting for the crossings with an awful shrill.' The raucous shriek of locomotive whistles has made night hideous for millions. Needlessly, it seems.

"The Chicago, Milwaukee & St. Paul Railway, after a series of tests, is installing on its engines a new chime whistle which, according to its designer, L. K. Sillcox, is as 'soft as the wood-winds of a symphony orchestra.' It has a baritone mellowness that not even a saxophone can surpass.

"After the new musical whistle was installed on the South-

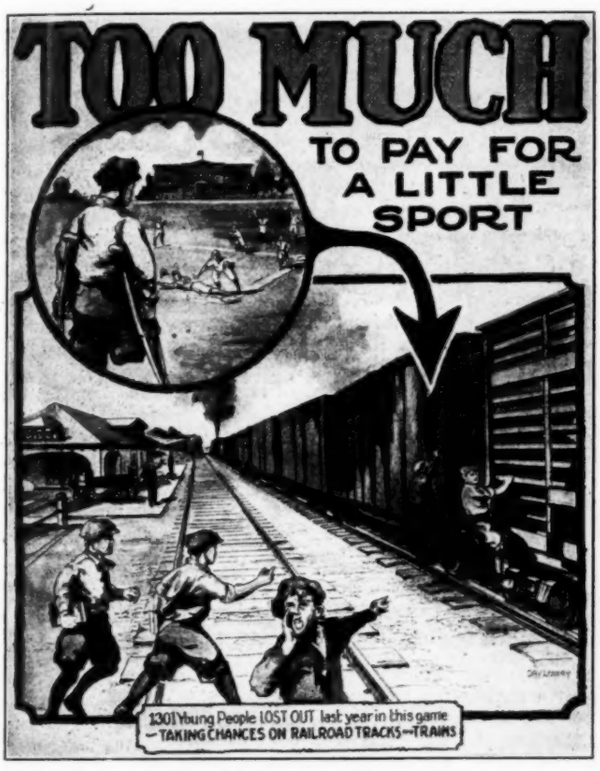
Wide World Photo

Wreck of the Scenic Limited, Waco, Colorado, September 5

west Limited, between Chicago and Kansas City, so many communications were received regarding it from passengers and residents along the line that its general use over the C. M. & St. P. system has been approved. Officers of the road are satisfied that the new 'bassoon whistle,' while extremely soft and pleasing to the ear, carries fully as far as the rasping screech of the older type."

Warning to Train Hoppers

Boys and girls constitute the principal topic of circular No. 134 of the committee on education, of the Safety Section of the American Railway Association, promulgating the program for the section for the month of October. Of all trespassers killed and injured on railroad premises, a large percentage consists of boys and girls under 14 years of age; and during the past nine years 2,149 of these children were killed and 2,759 were seriously injured, while walking or playing on tracks and while hopping on or off moving trains. The circular contains a number of



illustrations, one of which is reproduced herewith. The appeal to school principals and superintendents, parents and others culminates in the declaration that "the whole trouble is that our boys and girls have not been taught that railroad property is *private property*, and that it is not only dangerous, but dishonorable for the public to use it for any other than legitimate purposes."

Pennsylvania Spends $8,000,000 for Signals

The Pennsylvania announces that the automatic train control system, with forestalling device, has just been completed on the line from Baltimore, Md., northward to Harrisburg, Pa., 83 miles, and at the same time states that its present program contemplates the installation of automatic train control on 644 miles of road altogether; on the line from Harrisburg to Altoona (Middle Division) 131 miles; from Camden, N. J., to Atlantic City, 59 miles; from Pittsburgh, Pa., to Columbus, Ohio, 191 miles, and from Columbus, Ohio, to Indianapolis, Ind., 180 miles. This is a total of 1,530 miles of track.

The statement says that these improvements, with extensions of automatic signals now going on, will involve a total expenditure of $8,000,000, the largest investment of the kind ever undertaken on any railroad. The statement emphasizes the value of the visual and audible signals in the cab, one on the engineman's side and one on the fireman's. In connection with the Baltimore-Harrisburg line, 150 locomotives have been equipped and the plans altogether call for the equipment of 1,000 more.

The installation now in service gives three indications: "clear," "approach" and "slow," but an experimental section is being equipped with the "coder system" with which four indications will be given, namely: "clear," "approach," "approach-restricting" and "stop."

In this connection it is observed that the Pennsylvania was the first road to use these four indications (with semaphores) an installation of this kind having been put in use in the vicinity of Jersey City, N. J., in 1911. The Pennsylvania was also the first to install interlocking (about 1870); the first to use the block system (1863); the first to use the upper-quadrant three-position automatic semaphore (1906) and the first to operate the controlled manual block system with continuous track circuit.

The Pennsylvania was the first to develop the position-light signal and this type is now used in all new installations, gradually supplanting the semaphores.

The total length of the Pennsylvania's main tracks at the present time is 14,355 miles and all passenger train service is operated under the block system.

Rock Island Holds Athletic Meet

More than 300 employees of the Chicago, Rock Island & Pacific participated in the 30 events of the third annual Rock Island Lines athletic tournament held in the Drake University Stadium at Des Moines, Iowa, on September 11. The tournament, which was attended by employees and officers, was followed in the evening by a dinner at the Fort Des Moines hotel when the prizes to the winners were awarded.

The three principal trophies awarded included one given by Charles Hayden, chairman of the board, for the district securing the highest score; another given by J. E. Gorman, president, to the division scoring the greatest number of points, and a third from Edward N. Brown, chairman of the executive committee of the board, to the individual athlete securing the highest number of points in the various events. A 21-jewel gold watch was presented by the Ball Railroad Time Service to the individual who made the greatest percentage of improvement in one of the existing track records. Silver loving cups were awarded the winning teams in all unit events. Gold medals were given the members of the winning teams in the 440-yd. relay, basketball, five-man bowling and two-man bowling events. A gold medal for first place, a silver for second place and a bronze for third place were awarded the winners in the individual events. The cups given the winning teams or units in unit events are retained by the unit by which they are won until the 1927 tournament when they will be again awarded the winning units in the respective events. They remain permanently in the possession of units when won three years consecutively.

A few weeks prior to September 11 contests were held in each of the 13 divisions and men were chosen to represent the divisions in the tournament at Des Moines. The track and field events held at the stadium included the 50-yd., 100-yd., 220-yd. and the 440-yd. dash, the half-mile and the mile run, the 440-yd. relay, the running broad jump, the running high jump, the javelin throw, the discus throw, the shot put, the pole vault and the tug-of-war. Other events held at Des Moines, but not at the stadium, were bowling, golf, checkers, horseshoe pitching, tennis, baseball and trap shooting. A band concert and a first aid contest were held at the stadium.

The Brown trophy was won by a negro electric welder at Estherville, Iowa. The Hayden cup was won by the first district, while the Gorman prize was awarded the Illinois division. The golf tournament was won by an 18-year-old laborer at Trenton, Mo. The gold watch was awarded a clerk at St. Louis, Mo., who lowered the record in the mile run from 5 min. 20 sec., to 4 min. 58 sec. The same man also broke the record for the half-mile run.

Besides the breaking of these records, other entries improved the records in the 220-yd. and 50-yd. dashes.

Traffic News

The Wabash reports the largest single day's movement of freight on record in its 88 years' history, on Friday, August 20 when 11,334 carloads were moved. A total of 308,077 carloads were moved during the month.

The Interstate Commerce Commission opened its investigation on September 13 at Minneapolis, Minn., of the six-cent reduction in rail rates on grain and flour to the east, proposed in July by the Minneapolis & St. Louis and the Minneapolis, St. Paul & Sault Ste. Marie. Evidence was submitted by these carriers to show that the reduction should be allowed since the lower rate was made to reduce the existing differential against northwest grain milled in transit at Minneapolis and shipped all-rail to the seaboard and New England as compared with grain shipped from Duluth by way of the Great Lakes and manufactured at Buffalo. Grain markets and milling centers competing with Minneapolis for grain and flour business in the east are opposing the rate reduction on the ground that the cuts would throw the entire rate structure out of balance and give Minneapolis a discriminatory advantage.

Inland Barge Line to Open Offices in Minneapolis

The Inland Waterways Corporation, which will start the operation of a fleet of 15 barges and 3 tow boats on the upper Mississippi river next spring, will open traffic headquarters in Minneapolis, Minn., within the next 30 days. The traffic department is arranging for the handling of class and commodity freight when service is started in the spring. The barge line also plans to establish water service to Peoria, Ill., through the Hennepin canal, thereby giving the line a direct connection with eastern trunk railroads. A radio sending and receiving station will be erected on the upper river to direct the disposition of merchandise in transit on the barges and transmit reconsignment orders.

New Freight Records for Seven Months

The greatest freight traffic the railroads of this country were ever called upon to move during any corresponding period was handled during the first seven months this year, according to net ton-mile reports compiled by the Bureau of Railway Economics.

The net ton-miles for the seven months totaled 268,806,835,000, or 4,804,243,000 (1.8 per cent) above the best previous record (1923). Compared with the corresponding period in 1925 there was an increase of 18,417,766,000 net ton-miles or 7.4 per cent; and of 13.0 per cent as compared with 1924.

In the Eastern district the present record shows an increase of 8.1 per cent over that of the same period last year, the Southern district 10.1 per cent, and the Western 5.2 per cent.

The volume of freight handled in July this year also was the greatest for any July on record, amounting to 41,704,725,000 net ton-miles. This exceeded by 3.2 per cent the best previous July, which was in 1920, while it also exceeded July, 1925, by 8.9 per cent.

The daily average movement of freight cars in July was 30.5 miles, the highest for any July on record. This was an increase of 2.2 miles as compared with the best previous July, which was in 1917, and an increase of 2.7 miles as compared with July last year. It also was an increase of 5.0 miles as compared with July, 1924. The average load per car in July was 27.6 tons.

Motor Transport News

The Rutland Transportation Company has received authority from the Public Service Commission of Vermont to operate motor buses from Bennington, Vt., to the New York state line. Permission to operate from the Vermont state line to Chatham, N. Y., has already been granted by the New York Public Service Commission. The buses will replace a mixed train each way a day over a 57-mile route.

Commission and Court News

Court News

Contributory Negligence of Live Stock Caretaker

The Nebraska Supreme Court holds that an experienced live stock caretaker who, in climbing out of the caboose at night to inspect the stock, did not use his flashlight and fell from the bridge on which the caboose had stopped, and was injured, was contributorily negligent, barring recovery by him.—Gartner v. C. & N. W. (Neb.) 207 N. W. 937.

Highway Bonds Placing Whole Cost of Road on Railroad Held Confiscatory

The Circuit Court of Appeals, Ninth Circuit, enjoined as confiscatory the issue of highway district bonds for a highway to become part of a national highway, where it appeared the road would serve no substantial local need, the district being sparsely inhabited and little cultivated, and that no state or federal aid had been obtained. The railroad at whose instance it was enjoined owned most of the taxable property in the district, and so was liable for substantially the whole tax.—Yale Highway Dist. v. Oregon Short Line, 8 F. (2d) 676.

Slipping on Smooth Threshold of Mail Car

In an action by a mail clerk for injuries caused by slipping on the smooth iron threshold of a mail car while unloading mail, the Massachusetts Supreme Judicial Court holds that the railroad owed the plaintiff no greater duty than it owed to one of its own employees; i. e., it owed him no duty to call attention to dangers apparent to the senses of an ordinarily intelligent person, or to make improvements or changes which would make the place of labor safer than or different from what it manifestly was; and since ordinary observation of the threshold would have disclosed that it was smooth and therefore slippery, the plaintiff had no right of action.—Kelley v. N. Y. C. (Mass.) 150 N. E. 849.

Railroad Not Bound to Erect Barrier at Bridge Approach to Withstand Automobile

The Michigan Supreme Court holds that although a railroad was bound, where a winding road and bridge crossed its tracks, to erect a fence or barrier at the turn of the road on the approach to the bridge to warn travelers of its dangers, it was not bound to erect a barrier that would withstand the impact of an automobile. The driver of an automobile which went through the railroad's railing on such a curved bridge approach and over the embankment, was held negligent under Mich. Pub. Acts 1921, No. 368, section 21, requiring a driver to keep his automobile under control at bridges and sharp curves.—Quigley v. Grand Trunk Western (Mich.) 207 N. W. 846.

Unauthorized Motor Bus Operation Paralleling Railroad Enjoined

Motor buses between Boston and Keene, N. H., paralleling the tracks of the Boston & Maine between Boston and Fitchburg, with a regular passenger tariff and time-table, and operated without licenses from any of the municipalities through which they passed or bond filed, were held to be operated in violation of Mass. Gen. Laws, c. 159, sections 45, 46, as amended by St. 1925, c. 280. The Massachusetts Supreme Judicial Court holds that even though much the larger part of any person's business be interstate commerce, yet if he engages to any extent in local or domestic carriage, the requirement for a license or permit is a valid regulation respecting such intrastate commerce. Defendant was enjoined at the suit of the railroad company.—Boston & M. v. Hart (Mass.) 150 N. E. 212.

Equipment and Supplies

Locomotives

THE KAIYUANG-HAILUNGCHENG, China, has received bids through the builders for three locomotives.

THE CHAOCHOW SWATOW RAILWAY has received bids through Mitsui & Co., New York, for one locomotive boiler.

THE SUDOESTA DE BAHIA, Brazil, has ordered three Pacific type locomotives from the Baldwin Locomotive Works.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered four Pacific type and two six-wheel switching locomotives from the Baldwin Locomotive Works. Inquiry for this equipment was reported in the *Railway Age* of August 28.

THE ORANGE & FREDERICKSBURG has ordered one Mogul type locomotive from the American Locomotive Company. This locomotive will have 16-in. by 24-in. cylinders and a total weight in working order of 88,000 lb.

THE BROWNELL IMPROVEMENT COMPANY, Chicago, has ordered four four-wheel tank locomotives from the American Locomotive Company. These will have 14-in. by 22½-in. cylinders and a total weight in working order of 80,000 lb.

THE CANADIAN GYPSUM COMPANY has ordered three four-wheel tank locomotives from the Montreal Locomotive Works of the American Locomotive Company. These locomotives will have 10-in. by 16-in. cylinders and a total weight in working order of 39,000 lb.

THE BIRMINGHAM SOUTHERN has ordered two eight-wheel switching locomotives and two six-wheel switching locomotives from the American Locomotive Company. The eight-wheel switching locomotives will have 23-in. by 28-in. cylinders and a total weight in working order of 203,000 lb. and the six-wheel switching locomotives will have 22-in. by 26-in. cylinders and a total weight in working order of 166,000 lb.

THE NEW YORK CENTRAL has ordered 12 eight-wheel switching locomotives to have a total weight in working order of 219,000 lb., from the American Locomotive Company. Ten of these locomotives are for service on the Michigan Central and two on the Peoria & Eastern. An order for three, three-cylinder transfer locomotives, to have a total weight in working order of 286,000 lb. for service on the Indiana Harbor Belt, was also placed with the American Locomotive Company.

Freight Cars

THE NATIONAL TUBE COMPANY is inquiring for 14 skelp cars.

THE MISSOURI-KANSAS-TEXAS contemplates buying about 250 freight cars.

THE YOUNGSTOWN SHEET & TUBE COMPANY is inquiring for 28 slag cars.

THE GREAT NORTHERN is inquiring for 500 underframes for automobile cars.

THE HIGH POINT-THOMASVILLE & DENTON is inquiring for from 20 to 25 all steel box cars.

THE HAUSER-STANDER TANK COMPANY, Cincinnati, Ohio, is inquiring for 10 flat cars of 40 tons' capacity.

THE PHILLIPS PETROLEUM COMPANY, Bartlesville, Okla., is inquiring for 200 tank cars of 8,000-gal. capacity.

THE LION OIL REFINING COMPANY, Kansas City, Mo., is inquiring for 150 tank cars of 8,000-gal. capacity.

THE NEW YORK, NEW HAVEN & HARTFORD is asking for prices on steel parts for rebuilding 500, 40-ton box cars.

CONDON BROTHERS & CO. have ordered 10 20-cu. yd. lift door air dump cars from the Koppel Industrial Car & Equipment Company.

THE WALTON CONSTRUCTION COMPANY has ordered 18 20-cu. yd. lift door air dump cars from the Koppel Industrial Car & Equipment Company.

THE PITTSBURGH STEEL COMPANY has ordered six 30-cu. yd. drop door air dump cars from the Koppel Industrial Car & Equipment Company.

THE ANDREWS STEEL COMPANY has ordered one 30-cu. yd. drop door air dump car from the Koppel Industrial Car & Equipment Company.

THE LEHIGH COAL & NAVIGATION COMPANY has ordered one 30-cu. yd. drop door air dump car from the Koppel Industrial Car & Equipment Company.

THE C. A. SIMS CONSTRUCTION COMPANY has ordered six 30-cu. yd. drop door air dump cars from the Koppel Industrial Car & Equipment Company.

THE AMERICAN REFRIGERATOR TRANSIT COMPANY, reported in the *Railway Age* of August 7 as inquiring for 2,000 refrigerator cars, will construct these cars in the shops of the Missouri Pacific and the Wabash.

THE CHICAGO GREAT WESTERN has ordered 300 box cars and 200 automobile cars from the Pullman Car & Manufacturing Corporation. This order was reported in the *Railway Age* of September 11 as 300 box cars and 100 automobile cars.

THE CHICAGO & NORTH WESTERN has authorized the purchase of 100, 46-ft. flat cars, two special gun cars, 500 steel hopper cars, 100, 48-ft. low side drop end gondola cars, 250, 75-ton steel ore cars, 25 steel caboose cars, 500 stock cars and 1,000 automobile cars.

Passenger Cars

THE NEW YORK, NEW HAVEN & HARTFORD is inquiring for 10 steel underframes for baggage cars.

THE KAIYUANG-HAILUNGCHENG, China, has received bids through the builders for 20 passenger cars.

THE CHICAGO & NORTH WESTERN has authorized the purchase of 100 steel coaches, 20 steel combination baggage and smoking cars, 10, 70-ft. steel baggage cars, and three, 70-ft. combination baggage and smoking cars. The rebuilding of 35 steel passenger cars also has been authorized. This company has ordered two baggage and dormitory cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL has placed orders for 124 cars for passenger service. Inquiry for this equipment was reported in the *Railway Age* of August 14. The orders are as follows:

New York Central.	10 coaches	Pullman Car & Mfg. Corp.
	3 passenger and baggage.	Amer. Car & Foundry Co.
	30 suburban coaches.....	Osgood-Bradley Car Co.
	2 suburban passenger and baggage.	Osgood-Bradley Car Co.
	2 suburban pass., bagg. and mail.	Osgood-Bradley Car Co.
	20 milk	Merchants Despatch, Inc.
Michigan Central..	10 coaches	Pullman Car & Mfg. Corp.
	10 baggage 69 ft. 3 in...	Amer. Car & Foundry Co.
Boston & Albany..	10 coaches	Pullman Car & Mfg. Corp.
	2 passenger and baggage.	Amer. Car & Foundry Co.
	10 baggage 60 ft. 6 in...	Amer. Car & Foundry Co.
Pittsburgh & Lake Erie.	10 coaches	Amer. Car & Foundry Co.
	5 baggage and mail....	Amer. Car & Foundry Co.

Iron and Steel

THE NEW YORK CENTRAL is inquiring for 300 tons of steel for bridge repairs.

THE PENNSYLVANIA is inquiring for 900 tons of steel for catenary bridge work.

THE ERIE is inquiring for 200 tons of steel for platform canopies at Paterson, N. J.

THE NORFOLK & WESTERN has ordered 400 tons of steel from the American Bridge Company.

THE TOKIO SUBWAYS have received bids on about 550 tons of 100-lb. rail and accessories and 250 tons of 90-lb. third rail.

THE BOSTON & MAINE has ordered 800 tons of steel for a shop at Billerica, Mass., from the Jones & Laughlin Steel Company. The railroad ordered also 800 tons of bridge steel from the American Bridge Company.

THE JAPANESE GOVERNMENT RAILWAYS have received bids on 9,400 tons of 100-lb. rail and accessories and on 136,650 pieces of tie plates (about 500 tons). The Japanese Government Railways have also received bids on 430 tons of bridge material.

Machinery and Tools

THE CHICAGO, ROCK ISLAND & PACIFIC is inquiring for one wheel turning lathe.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS is inquiring for one Gantry crane.

THE NEW YORK CENTRAL has ordered a 44-in. heavy boring and turning mill and a 24-in. vertical drill press from the Niles-Bement-Pond Company.

THE PULLMAN CAR & MANUFACTURING CORPORATION has ordered an axle lathe, a car wheel borer and a 500-ton wheel press from the Niles-Bement-Pond Company.

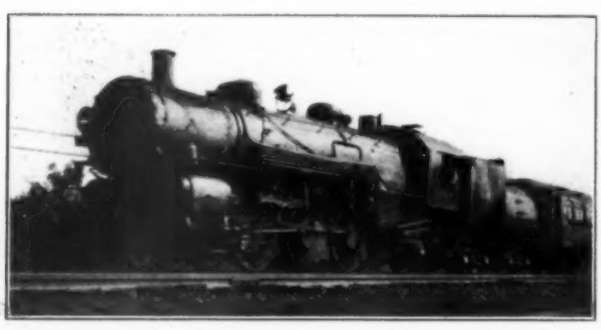
Signaling

THE NORTHERN PACIFIC has ordered from the General Railway Signal Company, an electric interlocking, six working levers, for Tacoma, Wash.

THE BOSTON & MAINE has ordered from the Union Switch & Signal Company an electro-pneumatic interlocking, 62 working levers, to be installed at Tower B, Prison Point, Boston, Mass.

A DRAFT FOR ONE THOUSAND DOLLARS has been received by the Chicago, Rock Island & Pacific from a former employee who had taken the money from the company forty years ago. From a letter accompanying the draft it appears that his reason for the theft was "the inadequacy of his pay, $55 monthly."

WHAT IS BELIEVED to be a new world record in the driving of railroad tunnels was made during the month of August in the eight-mile Cascade tunnel of the Great Northern when a pioneer drift 8 ft. high by 9 ft. wide was advanced 937 ft. in working on one face only. This record of A. Guthrie & Co., the contractors of this tunnel, is compared with a record of 932 ft. made in a heading of smaller section in the pioneer drift of the Rogers Pass tunnel on the Canadian Pacific in January, 1915.



An Erie Pacific on a Suburban Train in Northern New Jersey

Supply Trade News

The Wayne Tank & Pump Company, Fort Wayne, Ind., is preparing plans for a two-story plant, 62 ft. by 86 ft.

R. H. Rich has been appointed advertising manager of the **Cleveland Automatic Machine Company,** Cleveland, Ohio.

James H. Watters, assistant to the president of the **New York Air Brake Company,** New York, has been elected a vice-president.

Ralph Sheafe, formerly sales representative of the California Packing Corporation, San Francisco, Cal., has been appointed sales manager of the **Sheafe Engineering Company, Inc.,** with headquarters at Chicago.

E. C. Sicardi, president of the **Union Tank Car Company,** at New York, retired recently, after a service of about 36 years. **E. L. Gridley,** treasurer, has been elected a vice-president and secretary, with headquarters at Chicago.

A. Schwenck, sales manager at Grand Rapids, Mich., of the **Graybar Electric Company,** New York, has assumed the managership of the Providence branch, and **Frank Caestacker** of the Chicago branch has assumed the managership duties at Grand Rapids.

Charles C. Phelps, 473 Getty avenue, Paterson, N. J., has been appointed to handle the Marley superheater in New York City and Northern New Jersey. This superheater is made by the **Power Plant Equipment Company,** Kansas City, Mo., and is designed for use with horizontal return tubular boilers and other boilers of the fire tube type.

R. C. Simmons, formerly manager of the Seattle district of **Johns-Manville, Incorporated,** has been transferred to the New England territory, handling the railroad and United States Government work, effective September 13. Mr. Simmons will be associated with **C. D. Folsom,** at Johns-Manville, Incorporated, of Mass., 55 High street, Boston, Mass.

Cincinnati Grinders, Incorporated, Cincinnati, Ohio, was incorporated recently with an authorized capital of $1,500,000 common stock and has succeeded to the grinding machine business of the Heim Grinder Company, Danbury, Conn., and the Cincinnati Milling Machine Company, Cincinnati. The manufacture of the Heim centerless and the Cincinnati plain, universal and centerless grinders will be continued as heretofore, and early in 1927 will be united at Cincinnati in a modern plant thoroughly equipped for the manufacture of accurate grinding machines. The grinding machine business of both predecessor companies had outgrown their plant facilities and necessitated new and better equipped plants. These conditions prompted a combining of resources and organizations. The new company had acquired the Triumph Electric plant at Oakley, Cincinnati, and will convert this property into a modern and well equipped grinding machine plant. The new plant is expected to be in operation early in 1927 and will commence operations with a force of several hundred men. **P. O. Geier** is president of the new company, **George W. Binns,** secretary, and **F. M. Angevin,** formerly of the Heim Grinder Company, treasurer. The directors include **R. C. W. Harrison,** formerly grinding machine engineer of Churchill Machine Tool Company, Manchester, England, and **C. Booth,** formerly works manager of Heim Grinder Company, and previously engineer of the Heald Machine Company.

The general engineering department of the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., has been re-organized. This necessitated the re-allocation of several engineers, four being promoted to managers of engineering. These are: **F. C. Hanker,** manager of central station engineering; **S. B. Cooper,** manager of railway engineering; **G. E. Stoltz,** manager of industrial engineering, and **W. E. Thau,** manager of marine engineering. **S. A. Staege,**

formerly section engineer in charge of the paper mill section, has been appointed industrial engineer, giving particular attention to the paper mill industry. Other departments appointments are: Central station engineering, **C. A. Powel,** engineer, generating station engineering; **R. D. Evans,** engineer, transmission engineering, and **C. A. Butcher,** engineer, substation engineering. Railway engineering: **H. K. Smith,** engineer, heavy traction engineering; **G. M. Woods,** engineer, light traction engineering, and **A. H. Candee,** engineer, gas-electric traction engineering. Industrial engineering: **E. M. Bouton,** engineer, elevator engineering; **C. W. Drake,** engineer, general industrial engineering; **C. T. Guildford,** engineer, textile engineering; **C. H. Matthews,** engineer, mining engineering; **O. Needham,** engineer, steel mill engineering; **J. W. Speer,** engineer, material handling engineering; **W. W. Spratt,** engineer, paper mill engineering, and **E. B. Dawson,** engineer, electro-chemical and electro-metallurgical engineering. **N. W. Storer** was appointed consulting railway engineer in charge of the group handling of Diesel-electric locomotives and rail cars.

H. E. Graham has been appointed an assistant vice-president of the **American Car & Foundry Company** and will be associated with the sales department at New York. Mr. Graham was formerly connected with the Pressed Steel Car Company and later was vice-president in charge of sales of the Standard Tank Car Company.

August Locomotive Shipments

August shipments of railroad locomotives, from principal manufacturing plants, based on reports received by the Department of Commerce, totaled 124 locomotives, as compared with 132 in July and 118 in August, 1925. The following table gives the shipments and unfilled orders of locomotives for each month this year compared with 1925:

RAILROAD LOCOMOTIVES

Year and month	Shipments Total	Domestic Steam	Domestic Electric	Foreign Steam	Foreign Electric	Unfilled orders, end of month Total	Domestic Steam	Domestic Electric	Foreign Steam	Foreign Electric
1925										
January	98	41	12	43	2	414	322	44	33	15
February	88	69	7	9	3	414	318	51	33	12
March	117	88	13	14	2	461	324	51	71	15
April	101	78	14	9	0	490	343	41	77	29
May	101	65	9	25	2	478	324	48	75	31
June	114	58	8	42	6	411	274	47	65	25
July	76	56	12	4	4	386	259	39	65	23
August	118	91	6	13	8	334	199	48	72	15
Total (8 mos.)	813	546	81	159	27	...	...	...	...	...
1926										
January	121	96	11	14	0	653	506	53	52	42
February	163	101	22	38	2	572	442	60	30	40
March	162	146	11	4	1	780	635	50	54	41
April	151	122	12	1	16	713	580	44	60	29
May	140	105	14	12	9	726	585	46	72	23
June	159	133	11	12	3	667	522	53	72	20
July	132	82	20	30	0	555	445	36	51	23
August	124	78	5	34	7	525	455	38	16	16
Total (8 mos.)	1,152	863	106	145	38	...	...	...	...	...

Trade Publications

TOOL STEEL HANDBOOK.—The Ludlum Steel Company, Watervliet, N. Y., has issued the second edition of its Tool Steel Handbook, describing in detail carbon, alloy, rust and heat treating steels; their use; methods of treating, etc.

GRAVITY-LOWERING CHAIN BLOCK.—A four-page bulletin descriptive of the Morris gravity-lowering chain block, has been prepared by Herbert Morris, Inc., Buffalo, N. Y. This new chain block is built for long-ton loads of 2,240 lb. to the ton, instead of 2,000 lb.

GENERAL CATALOGUE.—The Ohio Brass Company, Mansfield, O., is distributing catalogue No. 20, completely listing all O-B porcelain insulators, trolley and line materials, rail bonds, car equipment and mining materials. Signal bonds and other special products of interest to the signal departments of steam railroads are grouped in one section of the catalogue, and there is a comprehensive listing of automatic car couplers, including electric and air connections, suitable for electrified terminal zones.

Railway Construction

ARDMORE, VERNON & LUBBOCK.—This company, recently incorporated in Oklahoma, has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from Ardmore, Okla., to Lubbock, Tex., 265 miles, stating that it proposes to finance the construction by the sale of 20-year 6 per cent bonds. L. K. Johnson, Vernon, Tex., is president.

BALTIMORE & OHIO.—The *Railway Age* has been advised that the information, appearing in its issue of September 4 that a contract had been awarded to the Bates & Rogers Construction Company, Chicago, for the construction of a roundhouse and extensive trackage at Youngstown, O., was incorrect.

BOSTON & MAINE.—Contracts have been awarded to the Dwight P. Robinson Company for the construction of a boiler shop as an addition to the locomotive repair plant at Billerica, Mass., and for improvement and extension of a roundhouse at White River Junction, Vt. The boiler shop will be 572 ft. long, 150 ft. wide, and 50 ft. high over the middle aisle, and will be constructed of steel and brick at an estimated cost of $500,000.

CHICAGO & NORTH WESTERN.—Plans have been prepared and bids are being received for the construction of a one-story office building at the Proviso, Ill., yard.

CHICAGO & NORTH WESTERN.—A contract has been awarded to S. G. Cool, Chicago, for the construction of an eight-stall brick enginehouse at Watersmeet, Mich., to cost approximately $35,000.

CHICAGO, BURLINGTON & QUINCY.—A contract has been awarded to Brainerd & LaRue, Rock Falls, Ill., for remodeling the passenger station at Sterling, Ill., estimated to cost $10,000. Plans are being prepared for the construction of a three-story brick and stone passenger station at Lincoln, Neb. A contract has also been awarded to Peterson & Co., St. Paul, Minn., for the construction of a one-story storage and oil house at Grand Crossing, Wis. It will have dimensions of 160 ft. by 50 ft., and will cost approximately $25,000.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—Bids will be received until September 20 for the construction of a passenger station at Bedford, Ind.

CHICAGO, MILWAUKEE & ST. PAUL.—A contract has been awarded to I. N. Sallyers, Estherville, Ia., for the construction of a frame freight and passenger station at Bridgewater, S. D., to cost approximately $10,000.

CHICAGO, MILWAUKEE & ST. PAUL.—Company forces are constructing a one-story frame steam power plant and a 10-stall frame engine house at Channing, Mich. The approximate cost is $60,000. Bids were closed on September 15 for the construction of a one-story hollow tile and stucco freight and passenger station at Waukon, Ia., estimated to cost $20,000.

CHICAGO, MILWAUKEE & ST. PAUL.—A contract has been awarded to George E. Burges, Menomonie, Wis., for the construction of a brick freight and passenger station at Menomonie, Wis., estimated to cost $7,000.

ERIE.—A contract has been awarded to the Automatic Sprinkler Company for the installation of an automatic sprinkler system on Pier 9, now under construction at Jersey City, and another contract to the Philadelphia Fire Retardent Company, Philadelphia, for the installation of 68 elevator doors on the same pier.

ILLINOIS CENTRAL.—A contract has been awarded to the Ellington-Miller Company, Chicago, for the construction of a one-story brick passenger station at Clarksdale, Miss.

ILLINOIS CENTRAL.—A contract has been let to Gaffin & Geahry, Fond du Lac, Wis., for the construction of a bridge at Manchester, Iowa, at an approximate cost of $50,000.

JACKSON & EASTERN.—Work has been started on the construction of the 40-mile extension of this line (a subsidiary of the Gulf, Mobile & Northern) from Lena, Miss., to Jackson, completing the original plans for a line from Union, Miss., to Jackson, 73 miles, connecting with the New Orleans Great Northern at the latter point. Bids are being received for the construction of a 190-ft. bridge across the Pearl river, east of Jackson. The 33-mile line already built from Union, Miss., to Lena, is undergoing grade reduction, construction of new trestles, and is being relaid with 85-lb. rail.

KANSAS CITY SOUTHERN.—Bids have been closed for the construction of a depot at Mansfield, La., to be 28 ft. by 144 ft., and to cost $22,000.

MISSOURI PACIFIC.—Bids closed September 18 for the construction of a powerhouse and engine room at Osawatomie, Kan.

NEW YORK CENTRAL.—This company is preparing to proceed with a $3,000,000 development program in Albany, including enlargement of the Union station and extension of upper level train sheds to the river front. In conjunction with the New York Central program, the Delaware & Hudson is said to be preparing to start the elevation of the tracks that carry its own trains and those of the West Shore so that these roads will enter the Union Station on the upper level. The program calls for the following features: Enlargement of Union station building, resulting in doubled capacity; construction of an upper level yard extending from the station to the river front; construction of a four-track approach to Maiden Lane bridge, replacing the present two track approach; relocation of baggage rooms and concessions; installation of a new system of passageways.

NEW YORK, NEW HAVEN & HARTFORD.—This company will improve its compressed air facilities at Worcester, Mass., at an estimated cost of $30,000.

NEW ORLEANS GREAT NORTHERN.—The Interstate Commerce Commission has authorized this company to construct an extension of its line from Nogan, Miss., to a site on the west bank of the Pearl river in Jackson, Miss., 6.65 miles, on condition that it allow the Gulf, Mobile & Northern and the Jackson & Eastern to operate over the proposed extension. The estimated cost of construction is $622,956.

PENNSYLVANIA.—This company has awarded contracts totaling approximately $500,000 as follows: to Harvey Redden, Inc., Newark, N. J., for grading and track work in extending the Waverly classification yards, Newark, N. J., estimated cost, $36,000; to Kuhn, Smith & Harris, Inc., New York City, for the construction of office on mezzanine floor of Pennsylvania station, New York City, estimated cost, $39,000; to the Building & Industrial Construction Company, Pittsburgh, Pa., for grading foundations and superstructure for new tank shop at Altoona, Pa., estimated cost $310,000; to Kelly, Atkinson Construction Company, Chicago, for erection of superstructure of bridge over Tuscarawas river, Newcomerstown, O., estimated cost, $115,000.

PITTSBURGH & LAKE ERIE.—Construction has started on a new 50 ft. by 150 ft., two-story freight house, a yard of 186 cars' capacity, and a public delivery yard at Ellwood City, Pa. The total cost of the improvements is estimated at $350,000.

READER.—This company has applied to the Interstate Commerce Commission for authority for the construction of a line from Hope to Eldorado, Ark., 63 miles, and also an extension from its present line in Nevada county to McNeill, Ark., 18 miles.

SOUTHERN ILLINOIS & KENTUCKY.—Bids will be received until September 24 for the construction of a 500-ton reinforced concrete coaling station at Reevesville, Ill.

TEXAS & PACIFIC.—A contract has been awarded to the Austin Company of Chicago for the construction of a one-story brick valve motor shop building at Marshall, Tex., to be 60 ft. by 80 ft., and to cost $15,000.

UNION PACIFIC.—This company has applied to the Interstate Commerce Commission for authority to build a line of approximately 2.5 miles easterly from Ripple, Colo., to connect with a plant to be constructed by the Union Oil Company of California for the manufacture of casing-head gasoline.

Railway Financial News

COAL RIVER & EASTERN.—*Acquisition.*—This company, which is controlled by the Brotherhood of Locomotive Engineers, has applied to the Interstate Commerce Commission for authority to acquire control by purchase of the line from Ashford to Warren S., W. Va., 2 miles, and to issue $250,000 of stock to the Coal River Collieries Company. Last year the commission denied the company's application for a certificate authorizing it to operate the line.

MINNEAPOLIS, NORTHFIELD & SOUTHERN.—*Securities Authorized.*—The Interstate Commerce Commission has approved the issuance of $750,000 first mortgage bonds, series A, $250,000 five-year convertible 6 per cent notes and $250,000 of common stock to be sold for the conversion of the notes. The bonds are to be sold to the Minnesota Loan & Trust Company at 95. The notes are to be offered to the stockholders at par and if not sold to them will be taken by the trust company and by a group of majority stockholders. The notes are to be convertible into common, par for par. The proceeds are to be used for new construction and to capitalize expenditures already made. This financing is in lieu of $1,200,000 bonds authorized last month but which bonds were not issued.

NEW JERSEY, INDIANA & ILLINOIS.—*Stock Dividend.*—This company has been authorized to issue $468,360 of common stock as a stock dividend to capitalize expenditures for road and equipment. The Wabash is the sole stockholder.

NEW YORK CENTRAL.—*99-Year Lease Opposed.*—The application for a temporary restraining order to prevent action on a proposed 99-year lease whereby the New York Central would absorb the Michigan Central was filed in the United States Circuit Court at Cincinnati, Ohio, on September 10, by the Continental Securities Company, a minority stockholder in the Michigan Central. The application alleges that the putting of the proposed lease into effect would be a violation of the federal anti-trust acts and the constitutional provisions of several states through which the railroad runs. It is further alleged that under the lease it is proposed to pay the minority stockholders of the Michigan Central an annual dividend less than that paid in 1925.

NEW ORLEANS GREAT NORTHERN.—1925 *Earnings.*—Annual report for 1925, recently issued, shows net income after charges of $162,058 as compared with $79,591 for 1924. Selected items from the income statement follow:

NEW ORLEANS GREAT NORTHERN

	1925	1924	Increase or Decrease
Railway operating revenues	$2,905,044	$2,925,031	—$19,987
Maintenance of way	409,706	444,099	—34,399
Maintenance of equipment	514,859	476,885	37,973
Transportation	861,231	905,100	—43,869
Total operating expenses	$1,993,320	$2,029,055	—$35,735
Operating ratio	68.62	69.37	—0.75
Net revenue from operations	$911,724	$895,976	15,748
Railway tax accruals	213,448	245,684	—32,236
Railway operating income	$697,766	$648,692	$49,074
Non-operating income	13,052	5,767	7,285
Gross income	$710,819	$654,459	$56,359
Total deductions from gross income	$593,375	$618,044	—$24,668
Net income	$162,058	$79,591	$82,467

NORFOLK & PORTSMOUTH BELT.—*Bonds.*—This company has been given authority by the Interstate Commerce Commission to issue $250,000 general and refunding mortgage 5 per cent bonds, series A, to be sold at not less than 97⅛ to Kean, Taylor & Co. of New York. This carrier is a switching road controlled equally by the New York, Philadelphia & Norfolk, the Seaboard Air Line, the Norfolk & Western, the Norfolk Southern, the Atlantic Coast Line, the Southern, the Chesapeake & Ohio, and the Vir-

ginian. The proceeds of the issue are to provide funds for future additions and betterments and to pay off $90,000 worth of notes. The carrier also proposed to procure authentication and delivery of an additional $250,000 of these bonds to be held subject to future order of the commission but the commission deferred action on this portion of the application on the ground that the record failed to disclose any present necessity for it.

STOCKTON TERMINAL & EASTERN.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority for the acquisition and operation of the line from Stockton to Bellota, Calif., which is now being operated by a committee of bondholders of the old company of the same name.

TEXAS CITY TERMINAL.—*New Control.*—The Interstate Commerce Commission has approved the acquisition of this company by the Missouri-Kansas-Texas, the New Orleans, Texas & Mexico (Missouri Pacific System) and the Atchison, Topeka & Santa Fe by purchase of capital stock under an arrangement whereby each carrier will have a one-third interest. The Southern Pacific, which declined to participate, is nevertheless to be accorded the same treatment as regards service and rates as the participating companies.

Dividends Declared

American Express Company.—$1.50, quarterly, payable October 1 to holders of record September 17.

Southern Railway.—Common, 1¼ per cent, quarterly, payable November 1 to holders of record September 21. Preferred, 1¼ per cent, quarterly, payable October 15 to holders of record September 21.

Average Price of Stocks and Bonds

	Sept. 14	Last Week	Last Year
Average price of 20 representative railway stocks	104.13	105.74	87.25
Average price of 20 representative railway bonds	98.07	98.31	91.60

Valuation Reports

The Interstate Commerce Commission has issued final or tentative valuation reports stating the final value for rate-making purposes of the property owned and used for common-carrier purposes, as of the respective valuation dates, as follows:

FINAL REPORTS		
Gould Southwestern	$98,264	1918
Ligonier Valley	751,900	1917
Houston Municipal	500,000	1919
Texas-Mexican	2,088,500	1919
TENTATIVE REPORTS		
Morgan's Louisiana & Texas	$21,510,400	1918
Ontonagon	43,715	....

Chicago, Milwaukee & St. Paul Trustees File Brief

Briefs and affidavits were filed by the Guaranty Trust Company, as corporate counsel, M. P. Callaway, as individual trustee, of the general and refunding mortgage of the Chicago, Milwaukee & St. Paul and W. W. Colpitts of Coverdale & Colpitts, with Federal Judge James H. Wilkerson on September 13 in answer to charges and petitions filed August 23 by Edwin C. Jameson as chairman of the so-called Jameson Bondholders' Defense Company. Mr. Jameson attacked the Kuhn-Loeb guaranty trust reorganization plan as unfair and in direct violation of the orders of the United States Supreme Court and asked that the upset price be set at not less than $80,000,000 subject to the Puget Sound mortgage of $150,000,000 and the refunding mortgage of $20,000,000.

The trustees denied that in the institution and conduct of the foreclosure proceedings they are acting under instructions from the reorganization managers connected with any plan or agreement of reorganization, or under instructions from any of the bondholders except under the provisions of final decree as set down by Judge Wilkerson. They further denied that any action taken by the trustees has been for the purpose of enabling the reorganization managers under any plan or agreement of reorganization to bid in the property embraced in the general and refunding mortgage or dispose of it under the terms of any plan or agreement of reorganization. The brief states that compliance by trustees with the request of more than 80 per cent of the outstanding bonds to ask the court to fix the date of sale and the minimum bid or upset price at which the property shall be offered for sale does not constitute a control of the action of the trustees, nor does it constitute such direction to support the charge made by the petitioners that the trustees are no longer in a position to act impartially for the benefit of all the holders of the bonds secured by the mortgages.

It was intimated at the time the Jameson affidavit was filed that if intervention were not allowed Mr. Jameson would head a syndicate which will be prepared to make a cash bid for the property. This, it was pointed out, would make the foreclosure sale an actual bidding proposition instead of a formal procedure.

Investigation.—Edward J. Pearson, president of the New York, New Haven & Hartford and formerly chief engineer of the Puget Sound extension of the Chicago, Milwaukee & St. Paul, was a witness in the hearings in the Interstate Commerce Commission investigation of the St. Paul which were resumed in New York on September 14.

Mr. Pearson summarized his observations as follows:

"The Milwaukee situation, as I see it, is one in which the road was substantially forced to take the step of extending, but unfortunately lacked not only the full knowledge perhaps, of fully completed estimates representative of not only the cost of the main line at the very much higher standard of construction which was later found necessary and became possible, but also of the many incidental lines and projects later found necessary for securing traffic.

"It was unfortunate in starting at a time when cost items commenced to climb. There has not been the anticipated realization of late (although prospects were encouraging earlier), of the expected volume of rail traffic in and out of the Northwest.

"The electrification which was influenced in part by certain necessities peculiar to the Milwaukee, is successful, highly desirable and productive of advantages and economies which to a large extent (even if not fully with present unexpected light traffic) offset charges on the investment.

"Traffic henceforth, should gradually improve. That part of the line personally viewed gives appearance of efficient and economical operation. Maintenance is good for the traffic and competition. It has capacity for added traffic.

"The main line of the extension compares desirably with its competitors in characteristics of construction, grades and shortened distance—the crossing of the Saddle Mountains being the price paid for shortened directness; electrical operation, however, of all divides operates largely to their flattening."

Mr. Pearson also summarized conditions in the Northwest in general and said:

"Apparently the valley of traffic depression has struck bottom, and henceforth there should be gradual but constant improvement. During the past fifteen years, the northwestern country as a whole has not retrogressed, and much has progressed; most cities have improved and grown decidedly, general indications of business and other conditions show substantial prosperity; agriculture gives the appearance of health; and receding forests in the South and Northeast must obviously result in a greater demand on those in the West as time passes, in respect to which, including the large areas south of the St. Joseph River, the Milwaukee is well entrenched at originating mills. President Donnelly of the Northern Pacific was recently quoted to the effect that the Northwest contains 900 billion feet of standing timber, out of which about 12 billion were cut during the past year. On this basis, no doubt you have better figures, there remains a 75-year supply.

"The development of fruit ranches is progressing, and when eventually the rapids of the Columbia River are harnessed, electrical hydraulic pumping for irrigation should result in the development for the Milwaukee of a much larger traffic in fruit. Mining looks more encouraging, as a result of the readjustment through time of the relationship between costs and production and the value of the product, together with great progress in the art of mineral recovery. There is apparently no reason why hereafter, the rate of general progress of the Northwest should not be commensurate with that in other sections. Viewing all of the factors, I predict a gradual increase in traffic, both freight and passenger, eventuating into much larger volume."

It had been stated previously in the hearings that electrification of the Puget Sound extension had saved the St. Paul about $1,500,000 annually. Representatives of the Interstate Commerce Commission at the hearing on Tuesday contended that this figure was too high particularly inasmuch as operation with electric locomotives had been compared with operation using obsolete steam locomotives.

On Wednesday, David J. Guy, a hydro-electric engineer and member of the Federal Power Commission, testified on the St. Paul electric power contracts and expressed the view that they were unreasonable as compared with power contracts on other railroad electrifications.

J. H. Hiland, a former vice-president, who retired in 1918, in testifying, gave his opinion that among the causes contributing to the St. Paul's difficulties were the competition of the Panama Canal, the war and the failure of people to settle in the West.

The hearing adjourned to a time and place to be announced later. Commissioner Cox said there would be three more public hearings. He expected, he said, to end the public hearings in October.

Railway Officers

Executive

Elisha Lee, vice-president in charge of operation of the Pennsylvania, with headquarters at Philadelphia, has been appointed vice-president, with the same headquarters, a newly created position. **M. W. Clement,** assistant vice-president in charge of operation at Philadelphia, has succeeded Mr. Lee as vice-president in charge of operation. **R. V. Massey,** general manager of the Eastern region, at Philadelphia, has been promoted to assistant vice-president in charge of personnel, a newly created position, with the same headquarters.

Operating

R. C. Barnard, division superintendent of the Pennsylvania, with headquarters at Cincinnati, Ohio, has been promoted to general manager and superintendent, with the same headquarters.

W. H. Hill, heretofore general agricultural agent of the New York Central, Lines West, has been appointed assistant to the manager of the New York Central Lines stock yards, with headquarters at East Buffalo, N. Y. **E. J. Leenhouts** succeeds Mr. Hill as general agricultural agent at Chicago.

J. L. Arthur, district superintendent of the Pullman Company, with headquarters at Kansas City, Mo., has been transferred to Los Angeles, Cal., and will be succeeded at Kansas City by **C. A. Miller. C. A. Roth** has been appointed district superintendent, with headquarters at San Francisco, Cal.

E. W. Smith, general superintendent of the Western Pennsylvania division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to general manager of the Eastern region, with headquarters at Philadelphia, succeeding R. V. Massey, promoted. **C. I. Leiper,** assistant general manager of the Eastern region at Philadelphia, has been appointed general manager of the Central region, with headquarters at Pittsburgh, a newly created position. **H. E. Newcomet,** general superintendent of the Lake division, with headquarters at Cleveland, Ohio, has been appointed general manager of the Western region, with headquarters at Chicago, a newly created position. **P. L. Grove,** general agent and superintendent of the Grand Rapids division, with headquarters at Grand Rapids, Mich., has become general superintendent of the Lake division, succeeding Mr. Newcomet. **J. H. Redding,** superintendent of the Pittsburgh division, with headquarters at Pittsburgh, Pa., has been appointed general superintendent of the Western Pennsylvania division, with the same headquarters, succeeding Mr. Smith. **C. E. Whitlock,** superintendent of the Eastern division, with headquarters at Pittsburgh, Pa., has become superintendent of the Pittsburgh division, succeeding Mr. Redding. **Porter Allen,** superintendent of the Norfolk division, with headquarters at Cape Charles, Va., has been appointed superintendent of the Eastern division at Pittsburgh, succeeding Mr. Whitlock. **G. W. Curtiss,** assistant superintendent of the Pittsburgh division at Cresson, Pa., has become superintendent of the Norfolk division, succeeding Mr. Allen. **R. E. Casey,** trainmaster on the Grand Rapids division, has been promoted to acting superintendent on the Grand Rapids division at Grand Rapids, Mich.

Traffic

C. R. Fryar has been appointed freight traffic agent of the Nashville, Chattanooga & St. Louis, with headquarters at Chattanooga, Tenn.

C. E. Christopher has been appointed assistant general freight agent on the Toledo, Peoria & Western, with headquarters at Chicago.

C. B. Andrews, soliciting passenger agent on the Canadian Pacific, with headquarters at Winnipeg, Man., has been appointed district passenger agent, with the same headquarters, succeeding **J. W. Dawson,** who has been transferred to Regina, Sask.

C. A. Birge, vice-president and traffic manager of the Oklahoma City-Ada-Atoka, with headquarters at Oklahoma City, Okla., has been appointed general freight and passenger agent. His duties as traffic manager will be taken over by **H. G. Thompson.**

J. S. Peshek, representative of the Peninsula & Northern Navigation Company, with headquarters at Minneapolis, Minn., has been appointed general agent for the Pere Marquette, with the same headquarters, to take charge of steamship, freight and passenger traffic for lines operating between Milwaukee, Wis., and Ludington, Mich.

L. R. Robinson, general agent of the Canadian Pacific Despatch, with headquarters at Boston, Mass., has been promoted to general freight agent for New England, with the same headquarters. **W. S. Elliott,** district freight agent at St. John, N. B., has been transferred to Cleveland, O., succeeding **Gerald Hiam,** transferred to St. John.

D. O. Wood, traffic manager, foreign freight department, of the Canadian National, has been appointed general freight traffic manager, with headquarters at Montreal, Que., to succeed **H. C. Martin,** who at his own request has been relieved of the duties of this position and will perform such special duties as may be assigned to him. The position of traffic manager, foreign freight department, has been abolished. Mr. Wood commenced his railway career with the Canadian National in August, 1883, as a sheeter. In the following year he entered the transportation department as a clerk. He was appointed special rate clerk in 1889; claims clerk in 1891; and chief clerk in 1894. In December, 1897, he joined the freight department as assistant foreign freight agent and in March, 1919, became traffic manager of import and export freight. On August 1, 1920, Mr. Wood was transferred to Montreal as general foreign freight agent and on May 1, 1923, became traffic manager, foreign freight department, which position he held until his recent appointment as general freight traffic manager. Mr. Martin was born in Madison county, O., in April, 1867, and began his service in the local freight offices of the Canadian National at Chicago as a clerk in July, 1888. In 1890, he joined the tariff bureau of the same railroad, becoming chief clerk in 1898. Four years later, Mr. Martin became agent for the Delaware, Lackawanna & Western and Grand Trunk at Chicago, returning to the tariff bureau of the Canadian National as chief, the following year. In 1909, he was promoted to second assistant general freight agent, continuing in this position until October, 1911, when he moved to Montreal as general freight agent. Mr. Martin became freight traffic manager in June, 1919, and in March, 1923, was appointed general freight traffic manager for the Canadian National system, which position he held until his recent retirement.

D. O. Wood

J. L. Norton, general agent of the Northern Pacific, with headquarters at San Francisco, Cal., has been appointed assistant general freight agent, with headquarters at Seattle, Wash., succeeding **J. L. Burnham,** promoted. **C. M. Grubbs,** general agent in the freight department at Seattle, will succeed Mr. Norton. Mr. Grubbs will in turn be succeeded by

H. H. Griffin, general agent in the Gray's Harbor district. **N. J. Heuchan,** general agent at Everett, Wash., will replace Mr. Griffin and in turn will be succeeded by **J. D. Hart,** traffic representative at Chehalis, Wash.

J. R. McClurken, general freight and passenger agent of the Louisiana & Arkansas, with headquarters at Texarkana, Ark., has resigned to become assistant general freight agent of the Illinois Central, with headquarters at Memphis, Tenn. **J. R. MacLeod** has been appointed assistant general freight agent of the Illinois Central, with headquarters at St. Louis, Mo.

W. A. Kittermaster, instead of **W. A. Kitteridge** as reported in the *Railway Age* of September 11, has been appointed general western freight agent of the Canadian Pacific, the Minneapolis, St. Paul & Sault Ste. Marie, the Duluth, South Shore & Atlantic and the Spokane International, with headquarters at Chicago, and with jurisdiction over territory extending from Cleveland, O., to New Orleans, La., and from Wyoming to Texas, exclusive of Utah.

W. C. Bowles, assistant freight traffic manager of the Eastern lines of the Canadian Pacific, with headquarters at Montreal, Que., has been promoted to special freight traffic representative, with the same headquarters and will be succeeded by **H. W. Gillis,** assistant general freight agent of the Eastern lines, with headquarters at Montreal. **A. Walker,** chief clerk in the freight traffic manager's office at Montreal, has been promoted to succeed Mr. Gillis. **A. L. Preston,** general agent, freight department, with headquarters at New York, has been promoted to general eastern freight agent at the same place.

Special

M. D. Young, supervisor of employment and supervisor of safety of the Lehigh Valley, with headquarters at Buffalo, N. Y., has resigned. He will be succeeded by **W. E. Berger,** chief clerk to the superintendent at Buffalo. Mr. Young was formerly superintendent of the Lake lines of the Lehigh Valley.

Financial, Legal and Accounting

C. G. Austin, Jr., general counsel for the Chicago & Western Indiana and the Belt Railway of Chicago, with headquarters at Chicago, has been elected vice-president and general counsel of both railroads, with the same headquarters. He was born on February 6, 1879, at Highgate, Vt., received his academic education at Brigham Academy in Vermont, and was graduated from the law department of the University of Wisconsin in 1902. Mr. Austin was admitted to the bar of Vermont in 1901, and engaged in general law practice at St. Albans, Vt., with his father and brothers from the time of his graduation until 1907. He then became general attorney for the Iowa lines of the Chicago, Milwaukee & St. Paul, with headquarters at Cedar Rapids, Iowa, and in 1910, entered the service of the Chicago & Western Indiana and the Belt Railway of Chicago as a member of the legal department at Chicago. In November, 1914, he was placed in charge of the legal department of the two companies as general solicitor and in September, 1918, he was made general counsel, which position he held until his election as vice-president.

C. G. Austin, Jr.

Vernon W. Foster, local attorney for the Illinois Central, with headquarters at Chicago, who has been appointed district and general attorney, with the same headquarters, to succeed **John G. Drennan,** retired, was born on January 16, 1881, at Norwalk, Ohio. He attended the Sandusky O., Business College and after entering railway service with the Illinois Central in 1898 as secretary to the auditor of passenger receipts at Chicago, he became a student at Kent College of Law, from which he graduated in 1902. Mr. Foster was admitted to the bar in the same year. After his first position with the Illinois Central, he served successively as secretary to the assistant general solicitor, secretary to the general solicitor, court reporter, investigator of claims and assistant to the local attorney. In 1906, he was promoted to assistant local attorney and in 1916 was again promoted to local attorney at Chicago, which position he held until his recent appointment as district and general attorney.

V. W. Foster

Mechanical

O. A. Garber, who was promoted to assistant chief mechanical officer of the Missouri Pacific, with headquarters at St. Louis, Mo., on September 1, was born on October 15, 1874, and entered railway service in 1891 as a machinist's apprentice on the Wabash at Springfield, Ill. After 10 years' service in this capacity he was promoted to erecting and roundhouse foreman on the Baltimore & Ohio at Lorain, Ohio. From 1903 to 1909, he served in a similar position on the Illinois Central at Paducah, Ky., and in 1909 he was promoted to general foreman at Mounds, Ky., later being transferred to Paducah, where he remained until 1912, when he was promoted to master mechanic at East St. Louis, Ill. In 1918 he was transferred to Waterloo, Iowa, and later to Memphis, Tenn., where he remained until March, 1925. He was then appointed mechanical superintendent of the Missouri Pacific, with headquarters at St. Louis, a position he held until his recent promotion to assistant chief mechanical engineer.

A. P. Housholder, who was promoted to mechanical superintendent of the Texas lines of the Missouri Pacific, with headquarters at Houston, Tex., on September 1, was born on November 7, 1879, and began railroad work in 1894 as a machinist's apprentice on the Southern at Knoxville, Tenn. In 1898 he was promoted to machinist at Salisbury, N. C., serving there and at Knoxville, Tenn., until 1899, when he became machinist on the Illinois Central at Paducah, Ky. He remained here until 1904, when he became a machinist on the Missouri Pacific at St. Louis, Mo. In 1906, he was promoted to roundhouse foreman at Jefferson City, Mo., later being transferred to St. Louis, where he remained until 1909, when he was appointed general foreman of the Illinois Central, with headquarters at East St. Louis, Ill. In 1912 he was appointed division foreman on the Missouri Pacific at Dupo, Ill., and seven years later he was promoted to acting master mechanic, with headquarters at Nevada, Mo. He was promoted to master mechanic at Nevada in 1919, later being transferred to DeSoto, Mo., and then to St. Louis, where he remained until his recent promotion to mechanical superintendent.

E. F. Stroeh, who was promoted to mechanical superintendent of the Missouri Pacific, with headquarters at St. Louis, Mo., on September 1, was born on November 24, 1876. He entered railway service in 1891, as a machinist's

apprentice with the Cleveland, Cincinnati, Chicago & St. Louis at Bellefontaine, Ohio, and was promoted to machinist before entering the service of the St. Louis, Iron Mountain & Southern in 1897 as a machinist and work equipment inspector. In 1901, he was promoted to roundhouse foreman at Alexandria, La., where he remained until 1903, when he entered the service of the Louisville & Nashville at Paris, Tenn., as a machinist, later serving in the same capacity on the Illinois Central at McComb, Miss. In 1903, he became machinist and air brake inspector on the Louisville & Nashville at Decatur, Ala., and in the same year was appointed machinist and division foreman on the Illinois Central at Paducah, Ky. Later he served until 1910 successively as roundhouse and machine foreman at Fulton, Ky., and as general foreman at Memphis, Tenn. From 1910 to 1912, he was foreman and superintendent of shops on the Missouri Pacific at Hoisington, Kan., when he was promoted to master mechanic at Kansas City, Mo., where he served until 1917. In that year he was promoted to superintendent of the North Little Rock, Ark., shops, a position he held until his recent promotion to mechanical superintendent.

Engineering, Maintenance of Way and Signaling

I. W. Geer, assistant general manager of the Western region of the Pennsylvania, with headquarters at Chicago, has become assistant chief engineer, with the same headquarters.

R. M. Smith, division engineer of the Central division of the Missouri Pacific, with headquarters at Van Buren, Ark., has been transferred to the Memphis division, with headquarters at Wynne, Ark., succeeding **R. H. Hallsted,** who has been transferred to the Central division.

Major Arthur J. Gayfer, division engineer of construction and location on the Canadian National, has been appointed division engineer of the Melville division, Saskatchewan district, with headquarters at Melville, Sask., succeeding **W. Waters,** who has been acting division engineer in place of **G. Murray,** who is on leave of absence.

Obituary

Gen. Henry T. Douglass, at one time chief engineer of the Baltimore & Ohio, died on July 20 at the age of 88.

H. Morris, master mechanic on the Galena division of the Chicago & North Western, with headquarters at Chicago, died on September 10, at Chicago, following an operation.

W. R. Smith, master mechanic at the Chicago Terminal of the Chicago & North Western, with headquarters at Chicago, died on September 11, at Chicago, following a short illness and an operation.

J. E. Johnson, division engineer of the Port Huron-Grand Rapids division of the Pere Marquette, with headquarters at Saginaw, Mich., was killed on September 8, in a railway motor car accident near Moseley, Mich.

William Henry Fetner, chief mechanical officer of the Missouri Pacific, who died at his home in St. Louis, Mo., on September 7, following an illness of several months, was born on September 1, 1867, at Columbia, S. C., and was educated in the public schools there. He began his railroad career with the Illinois Central in May, 1881, at Water Valley, Miss., and was consecutively, until 1892, machinist, gang foreman and locomotive engineer with the Southern at Columbia, S. C. In 1892, he became a gang foreman in the shops of the Central of Georgia at Macon, Ga., and he served successively at the same place as erecting shop foreman, general foreman and master mechanic. Later he was promoted to master mechanic for the entire system and on November 16, 1917, he was promoted to superintendent of motive power, with headquarters at Savannah, Ga. He held that position until July 16, 1923, when he was appointed assistant to the president of the Missouri Pacific. On April 1, 1924, he was appointed chief mechanical officer, with headquarters at St. Louis, Mo. Two years later his authority was extended over the Gulf Coast Lines and the International-Great Northern, which position he held until the time of his death.

George W. Holdrege, who retired as general manager of the Western lines of the Chicago, Burlington & Quincy, in 1921, died on September 14, at his home in Omaha, Neb.

G. W. Holdrege

Mr. Holdrege was born on March 26, 1847, at New York City, and was educated at Harvard University, being graduated with the class of 1869. Mr. Holdrege entered the service of the Burlington in 1869 as a paymaster and storekeeper in the office of the Burlington & Missouri River (now a part of the Burlington) at Plattsmouth, Neb. A year later he was transferred to the offices of the company at Burlington, Ia., and afterward entered train service, serving for one year as a conductor. He was then made superintendent of construction of the Chariton branch westward from Chariton, Ia. In 1872 he was made trainmaster at Burlington, and the next year assistant superintendent at Plattsmouth. He became general superintendent of the lines west of the river in 1878, assistant general manager in 1882, general manager of the Burlington & Missouri River in 1884, and general manager of the Chicago, Burlington & Quincy lines west of the river, in 1903, which position he was holding when he retired in 1921.

Colonel E. M. Heigho, formerly president and general manager of the Pacific & Idaho Northern, who died at his home in Boise, Idaho, on August 27, was born on October 23, 1867, at Grays, Essex, England, and entered railway service in 1882 as an office boy in the general freight office of the Michigan Central at Detroit, Mich. Until 1886 he was employed consecutively in clerical capacities in the offices of the Erie & North Shore Dispatch, the Wabash, St. Louis & Pacific, and the Michigan Central, all at Detroit, Mich. During the following year he served as chief clerk to the assistant freight claim agent of the Union Pacific at Kansas City, Mo., and clerk in the freight auditor's office at Omaha, Neb. From 1887 to 1890 he was chief clerk to the superintendent of the Idaho Central at Boise City, Idaho. In 1891, as a transitman, he surveyed the Lost river country in Idaho and in 1892 was made rate clerk in the office of the freight traffic manager of the Missouri Pacific at St. Louis, leaving that position to become chief bookkeeper for the Allen Foundry Company at Detroit, Mich., and later assistant general manager. From 1893 until 1899, when he re-entered railroad service as a clerk in the freight traffic department of the Oregon Short Line at Salt Lake City, Utah, he was superintendent of a foundry company at Cleveland, O. In 1901 he was appointed assistant chief clerk in the freight claim department and in 1903 was made auditor of the Pacific & Idaho Northern. The next year he was elected vice-president, general manager and treasurer of the same road, which positions he held until December, 1909, when he was elected president, general manager and traffic manager. In September, 1915, he was appointed receiver of the Pacific & Idaho Northern, at which time he combined the duties of the offices of general manager, traffic manager, treasurer and purchasing agent, with those outlined above. Mr. Heigho suffered a severe stroke of paralysis in November, 1917, but continued in close touch with his duties as president and general manager until October, 1918, when he resigned as general manager, retaining the presidency until his complete retirement in March, 1919.